

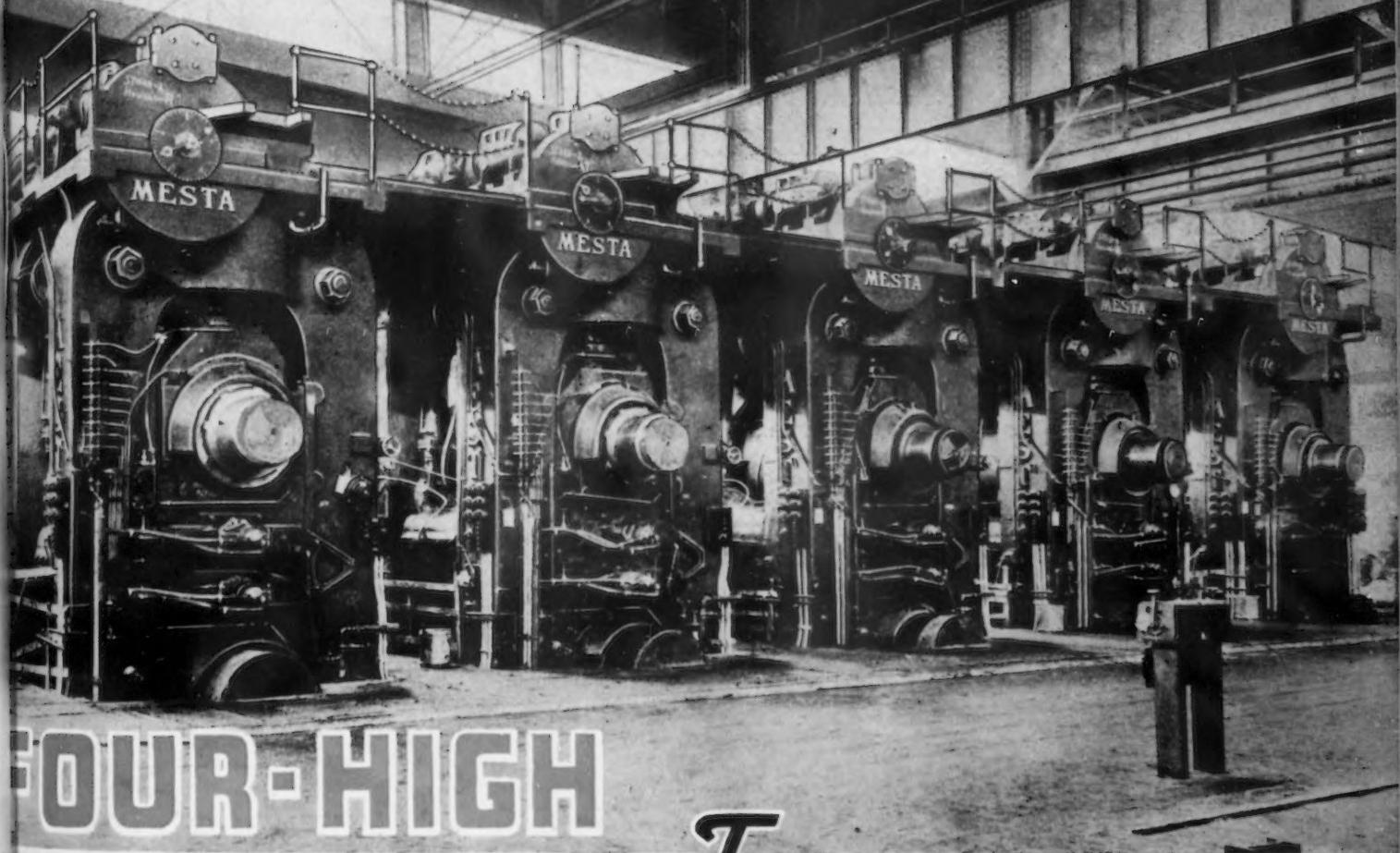
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THE IRON AGE

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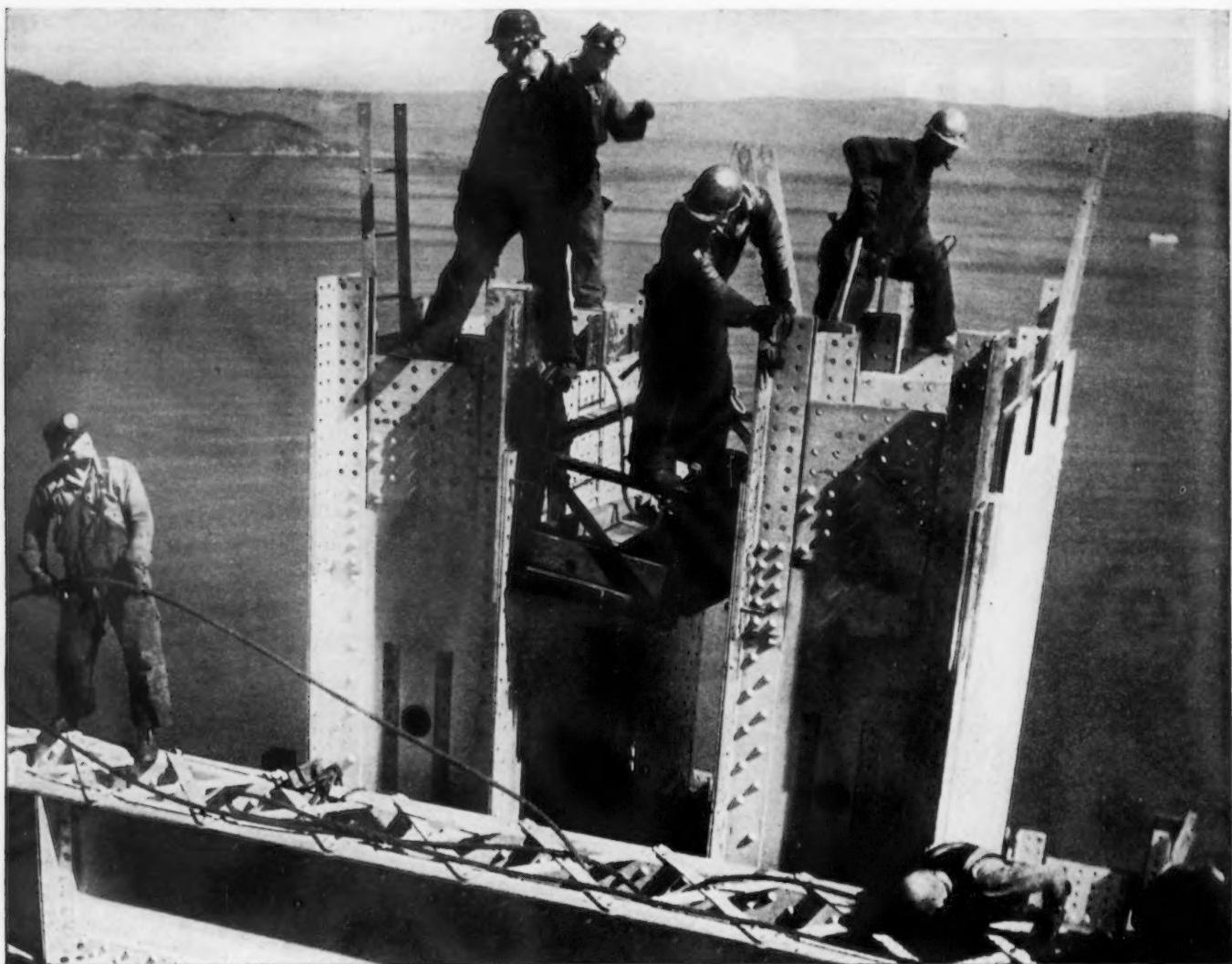
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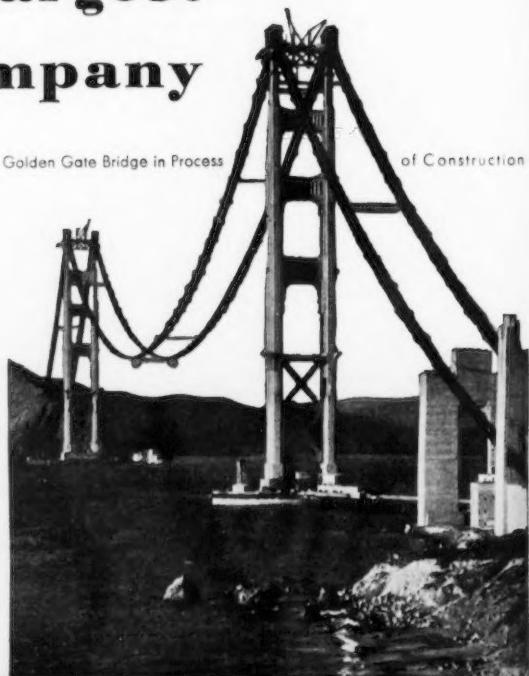
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Golden Gate Bridge in Process of Construction



BETHLEHEM STEEL COMPANY

... THE IRON AGE ...

APRIL 9, 1936

ESTABLISHED 1855

Vol. 136, No. 15

Prepare for Flood Control...

We can learn something from every happening, if we will. The recent flood experiences of industrial areas are no exception to this rule. They hold a remarkable lesson for open minds.

They form an object lesson in what may be accomplished when there is unanimity of purpose between employers and employed.

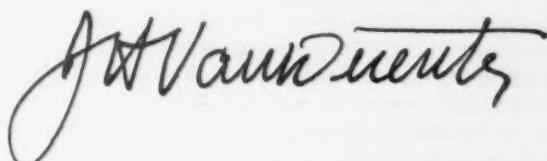
When the "waters covered the earth," in Pennsylvania and New England, there was general apprehension that such a disaster would seriously slow down our industrial tempo. The general opinion of well informed people who realized the enormity of the deluge was that many weeks or even months would be required to put industry's house in order.

On the contrary, even in the most seriously affected districts, business was proceeding as usual within a week or at most 10 days. Submerged plants and departments were turning out steel and newspapers and electric power at an even faster rate than before the catastrophe.

The reason for this almost miraculous recuperation was not hard to find. It lay in the cooperation between employers and employed against a common enemy, the flood, which threatened profits and wages alike.

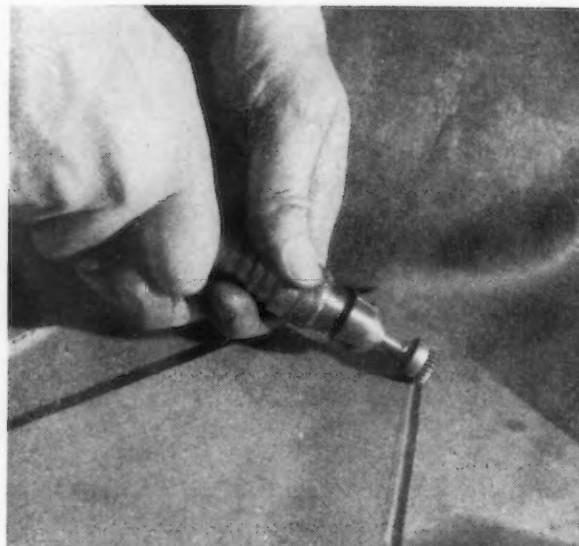
There was no thought of class distinction or craft prerogatives in this emergency. Executives, foremen, white collar men and skilled labor worked side by side and joined the "labor gang" in the big clean-up campaign that was so effectively executed. A common effort against a common enemy. An enemy that every wage earner could immediately recognize as threatening his earnings and livelihood.

There is a lesson, too, in this for those of us who sincerely believe that the threatening waters of Communism and Fascism, of suppression, intolerance and lust for political power form a serious menace to the foundations of both profits and wages of American industry and business. Let us do all within our power to reveal clearly the import of this common enemy so that employers and employed can unite in fighting to preserve common interests and to defeat a common threat to all. And let us do this quickly before such despotic tyranny as the Van Nuys bill makes it a crime for employers and employed to engage in the mutual discussion of their common interests.



• • •

OIL groove cutter employed in grooving a cast iron part. The cutter is mounted on an arbor with guide roller for gaging the depth of the groove.



... Improvements Widen Use ...

• • •



MUCH has been written of the substantial progress in design and application of machine tools and other production machinery, but comparatively little about what has been designated as "aids to production," many of which have undergone considerable improvement in the past few years.

Portable tools of all types are examples of such "aids to production." Uses of such tools are legion and are still expanding. Flexible shaft equipment—an old acquaintance of all who visit dentists—is to be found, for instance, in fish markets, paleontological and preparatory departments of museums, hospital operating rooms and many other unexpected places as well as in machine shops, die, mold and pattern shops, and in production

lines of numerous metal working plants. In the last named, the production line, it is finding increasing application in such operations as cleaning up fins and burrs on non-ferrous castings, in removing weld flash and surplus solder, breaking the edges of sheared and stamped metal parts, in burring drilled holes and in other operations. To meet these varied demands, makers of such equipment have progressively developed new designs or have improved or adapted older ones.

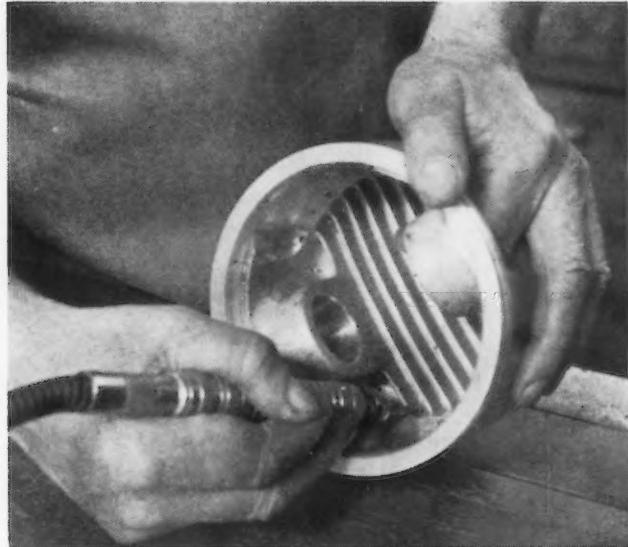
Modern flexible shaft outfits comprise an electric motor, equipped with a set of pulleys and connecting belt; a flexible shaft consisting of an inner core which transmits power to the cutting tool; a casing for the core; and a handpiece or attachment for holding and guiding the tools. The entire unit is mounted in a universal swivel yoke, on a bench stand or a floor stand or suspended from overhead. There are a number of attachments, such as a speed increasing or speed reducing handpiece, two-hand grind-

ing devices, reciprocating lapping and reciprocating filing attachments, mica undercutters, screw driving, nut setting, right angle sanding and polishing, and filler rubbing attachments—the last used principally on gray iron castings.

With flexible shaft machines, as with other types of portable tools, free-hand guiding of the tool is made possible, thus permitting power finishing of surfaces impossible to get at with a mechanically guided tool, and uneconomical to furnish by the "human muscle and hand tool" method alone.

Improvements Embrace All Components

Improvements in flexible shaft outfits have embraced all components. Motors are fully ball bearing, and in many cases are inclosed to protect against dust and vapors. They are now designed for operation in a vertical as well as a horizontal position. The whole driving unit swings freely, both horizontally and vertically, adjust-



BURRING of oil holes in aircraft engine piston.

Use of Flexible Shaft Equipment . . .

ing itself instantly to the position in which the handpiece is held, thus causing the least possible bend in the shaft. A great variety of speeds is provided to permit the economical use of a wide range of tools. The cable or core is being made of stronger materials and is more flexible because of the greater uniformity of the wire and other elements entering its construction. Sheaths or casings have been made non-shrinkable, non-stretching, non-leaking and non-heating. Maintenance costs of flexible shaft equipment have been greatly reduced by the development of a special non-raveling cable which permits quick renewal of shafting that has been damaged, or is otherwise not operative. When, after long use, the flexible cable breaks, it can be replaced in less than 20 min. by this new cable carried in stock by the user in the usual mill length, about 25 ft. It may be obtained in the standard music or stainless steel wire. The latter has the double advantage of lasting longer in ser-

vice and of being rust free, a feature particularly valuable, as it is not advisable to grease a length of cable kept on hand in customer's stock room. This method of renewing damaged cables requires but little equipment: a vise, a blow torch and some means of severing the broken cable, such as a cut-off grinding wheel or even a cold chisel and hammer. The repair can be made by anyone who has had some experience in soldering.

The general improvement has also included the handpieces and attachments by which the tool is held, revolved and guided. Handpieces of the Kellerflex equipment, for example, now include anti-friction bearings of a special type, with balls spirally arranged in a bakelite cage, each ball developing its own groove in the races. This design not only assures efficient transmission and smooth operation, but also makes for a more delicate control and assures long life through the elimination of heating up—the latter being, perhaps, the

○ ○ ○

By H. P. LOEWENBERG
Keller Division, Pratt & Whitney Co., Hartford, Conn.

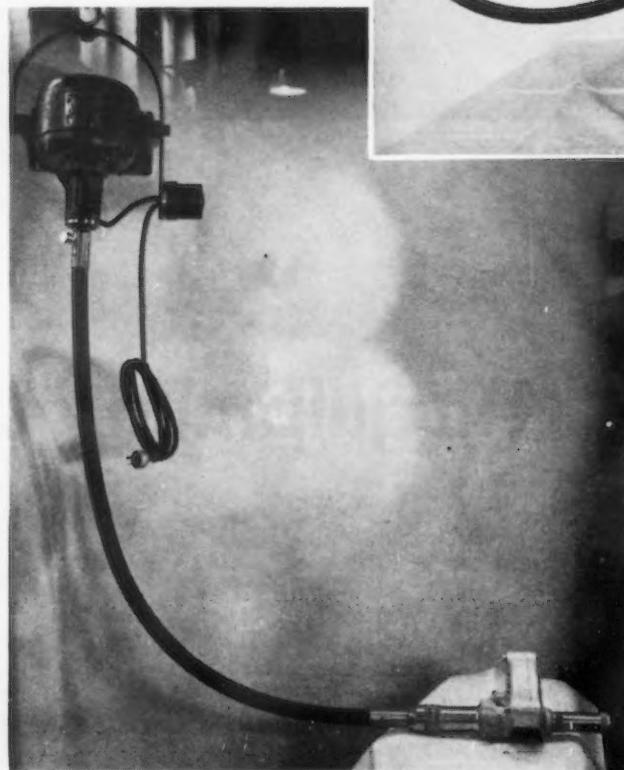
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Achilles heel of flexible shaft equipment.

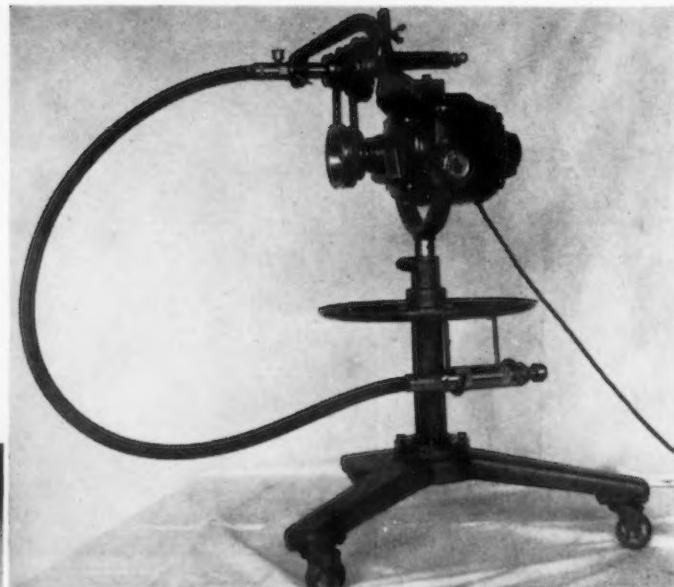
Substantial progress has been made in designing and applying high-speed flexible shaft machines to meet the ever-increasing demand for higher speeds, especially where small grinding wheels and gem points are to be used. An interesting application of such a unit is found in the working of tungsten-carbide dies used for drawing of ferrous and non-ferrous shapes. In some cases, these dies are first diamond bored to about 0.005 to 0.006 in. of their finished size. Tool marks, left by the boring tool, are then removed with newly developed

diamond wheels mounted on a steel mandrel. This method of finish grinding to within 0.0005 to 0.00075 in. of the finished size constitutes a marked saving over the previous method where diamond power was employed. This machine is also suitable for finish lapping the approach angle and front opening of cemented-carbide dies, and to round or blend the various surfaces into each other when finishing a die. On irregular shaped tungsten-

AT RIGHT
SINGLE-SPEED suspended Kellerflex unit with two-hand grinding device.



BELOW
NON-RAVELLING cable has been developed to permit quick renewal, by users, of flexible shafting that has been worn out or damaged. This is one-step—cutting off—in the renewal operation.

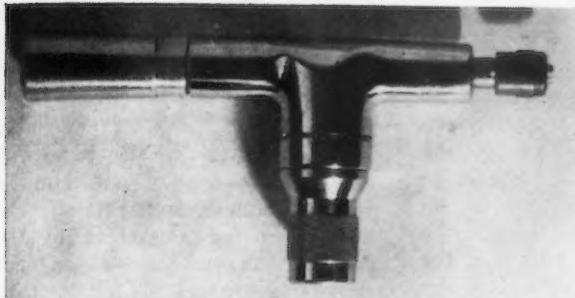


HEAVY-DUTY, multiple-speed flexible shaft machine, the Kellerflex JF-3, on an adjustable roller stand.

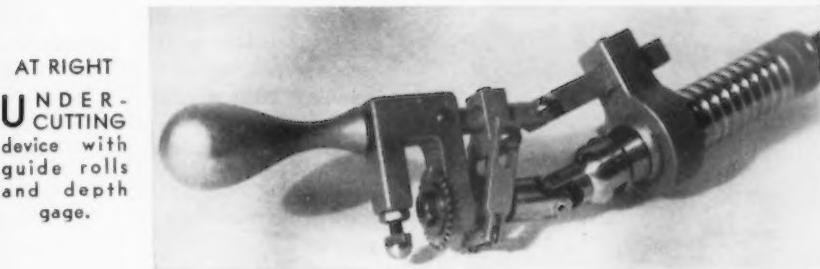
carbide dies, the rotary motion of the machine may be converted into a reciprocating motion by means of a newly developed and sensitive lapping attachment.

Wide Variety of Attachments

In keeping with the trend toward specialization, a great variety of attachments for special applications has been developed. The first of this group comprises a high-speed device for use with small grinding wheels, preventing them from wearing down unevenly, and making them last longer. Tools driven through the high-speed attachment run at a speed three times that of the normal speed of the flexible shaft. Spiral bevel gears of special heat-treated alloy steel are used, and all moving parts run in ball bearings. A low-speed attachment has been designed for purposes of reaming, filler rubbing and other low-speed operations. Right-angle sanding and polishing attachments are used in large numbers and to marked advantage in the sanding and finishing of large surfaces, particularly in the automotive industry. Screw driving and nut setting attachments are being used in ever-increasing numbers, not only for the purposes suggested by their names, but also for removing plastic caps and covers from molds, as well as for



AT LEFT
ATTACHMENT for lapping tungsten-carbide dies of irregular shape.



AT RIGHT
UNDER-CUTTING device with guide rolls and depth gage.

bottle capping. Filing and lapping attachments are available for work where hand filing is extremely difficult and fatiguing. A mica undercutting device is used advantageously for maintenance purposes.

Tools Include Burs and Rotary Files

Cutting tools now available also reflect the improved status and the wider application of flexible shaft equipment.

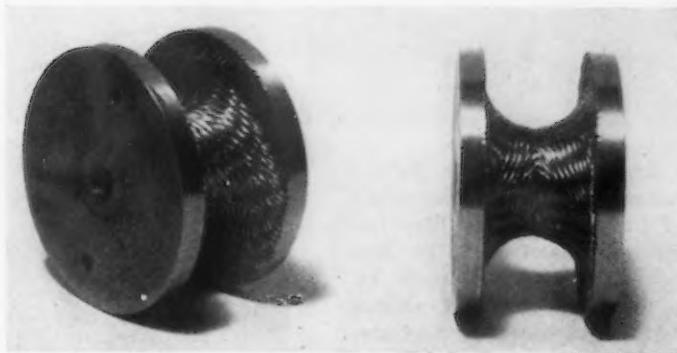
First and most widely used are the burs and rotary files. The Kellerflex division of the Pratt & Whitney Co. offers 14 or more standard sets comprising more than 300 different shapes, types and cuts. A line of arbors to adapt these tools to all types of portable and stationary equipment is also manufactured. Of the standard sets, nine sets are mill cut, four sets are file cut and one set is rasp cut. Mill and file cut burs may be obtained, in turn, with plain tooth formation or cross cut, and in one or more degrees of coarseness; namely, extra-fine, fine, medium, coarse, extra-coarse, rasp, herringbone and various special types. They may be made of either carbon tool steel or high-speed steel, some being furnished either with or without ground flutes. In some cases, where maximum free cutting of soft materials or unusually long life is required, the tools may be chromium plated.

The terms "mill cut" and "file cut" refer to the method of manu-

facture. A mill cut bur may be milled, milled and ground, or ground from the solid heat-treated blank. The plain cut is merely the plain milled or plain ground tooth, whereas the cross cut is the same tooth with a spiral cut running in the opposite direction. The purpose of the cross cut is to break up and eject the chip, especially in the softer materials.

Then there is the file cut bur, made by hand—some in plain spiral cut, others in herringbone. The latter form of cut is designed to eliminate digging in or creeping of the bur in places where limited areas are to be finished and where the finishing must not go beyond a definite point.

Burs today are of higher quality, which is reflected not only in the better materials and improved



SPECIAL bur for smoothing-up joints of welded wire.



GROUP of burs—both mill cut and file cut.

methods of hardening, but also in tooth and flute formation. For example, the angle and depth of any hand-cut bur can be controlled within close predetermined limits by the operator setting his chisel to the desired angle. The chisels used are ground to standards developed for the purpose.

Different Burs for Different Materials

Development work on the part of makers of tools for flexible

drums applicable to all types of portable tools, including flexible shaft, and also stationary equipment. These drums consist of an expanding rubber core mounted on an arbor with two compression washers and nut. An endless abrasive belt or sleeve is mounted on the rubber core, whereupon the core is expanded by tightening the nut. These tools may be used for finishing and polishing steel, brass, bronze, copper, aluminum, wood, etc., as well as for removing spot weld marks and solder from sheet

operations. The time consumed in changing an abrasive belt or sleeve is less than 1 min. Wide and even sanding surface adds to speed of output.

A lapless type of sleeve, as well as a standard type of belt, is made. In the lapless construction, the abrasive-coated sleeve is in the form of an endless belt without projecting or raised joints, thus assuring even contact with the work. All materials used in making both types of belts are of standard make, pre-shrunk and of uniform size—therefore easy and instantaneous replacing of belts on the expanding rubber drums is possible.



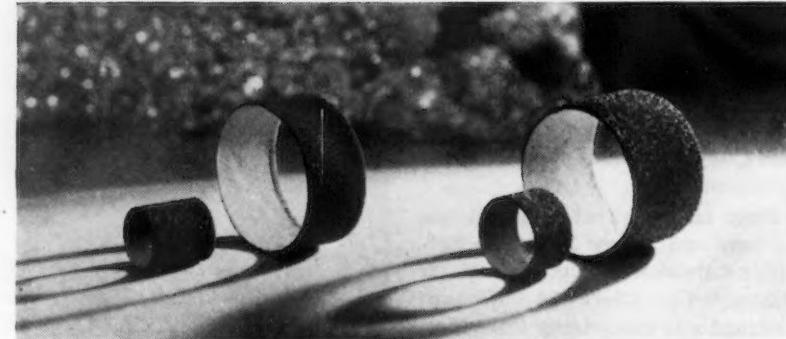
GROUP of sanding drums. The recessed washer and nut arrangement is shown in the drum in the center.

shafts and other portable outfits also comprehends the standardization of burs and rotary files for particular classes of work. For use on the softer metals, such as bronze, brass, copper and aluminum, burs of high-carbon steel are recommended, the types and degrees of coarseness of cut being governed by the finish desired. For harder metals and where high speeds are required, burs of high-speed steel are offered. Different spirals, rake angles and other elements of burs of all types have been worked out for use on different materials.

In this connection it may be pointed out that the Pratt & Whitney Co. has developed a machine for testing and comparing burs of different designs and finishes on materials of different kinds. By means of this research and experimental equipment, the conditions under which burs will function best—what cut, heat treatment, etc., will give the best results on any given material—can be readily determined.

New Polishing or Sanding Drums

In addition to burs and rotary files, there has been considerable development in polishing and sand-



LAPLESS type abrasive sleeves are also available for the sanding drums.

metal work and the like. A prominent present use for them is in the finishing of stainless steel after welding or grinding to bring back the original grain.

A feature of the new Kellerflex line of sanding drums is that the compression washer, as well as the nut for expanding the rubber core, is recessed to permit working in close corners and to preclude the possibility of damage to the work-piece. High accuracy, strength and mechanical safety are other features of this design of drum. In many cases, drums of this type eliminate rag buffs with their equipment for re-dressing, also eliminating set-up and balancing

spindles to assure true running and smooth operation. Cementing of stones on the mandrels or shanks has been very much improved. The new method practically makes stone and shank an integral part, thus obviating a troublesome difficulty, namely, the separation of wheel and shank before the useful life of the wheel has been exhausted.

Enough has been said, it is hoped, to indicate that development progress in the flexible shaft branch of the portable tool industry has been substantial, and that the industry as a whole has not only been meeting but anticipating the requirements of users of such equipment.

FIG. 2—The feed worm wheel is now machined on 36-in. spiral-drive high-speed type vertical lathe, and a new method of group tooling is employed. The larger lathe not only permits machining at higher speeds, but also provides greater flexibility for handling of other work. The group tools include operations formerly done on the second chucking.

• • •
By R. E. MILLER
• • •



Modern Machine Plus New Tooling Cuts Cost for Machine Tool Builder



BY using one of its own latest type high-speed vertical turret lathes of larger capacity than necessary and designing unique tooling for the job, the Bullard Co., Bridgeport, Conn., has cut the machining time of a feed worm wheel from 32 min. to approximately 10 min. This large size machine has sufficiently high speeds available for the comparatively small bronze job, and at the same time accommodates a wider range of other work when the feed worm wheel is not in production.

It has been said that machine tool builders do not always practise what they preach in regard to plant modernization. Aside from the futility of generalization in such broad matters, the worm wheel job here described is one of many possible examples that definitely proves the contrary.

This feed worm wheel, used on the company's Mult-Au-Matic lathes, is made of S.A.E. No. 65 alloy bronze, a tough material to machine. The piece is 12½ in. in outside diameter and has a 6-in. bore. Machining is done in two

chuckings, but the second chucking is equipped with regular tooling and is employed in the usual manner. The following description will be confined, therefore, to operations on the first machine. These operations include rough and finish turning, facing, boring, and chamfering. After leaving the turret lathes, the worm wheel goes to the gear cutting department for hobbing of the teeth.

In the former method of turning, facing and boring, these wheels, a 24-in. Bullard vertical turret lathe was employed, and two

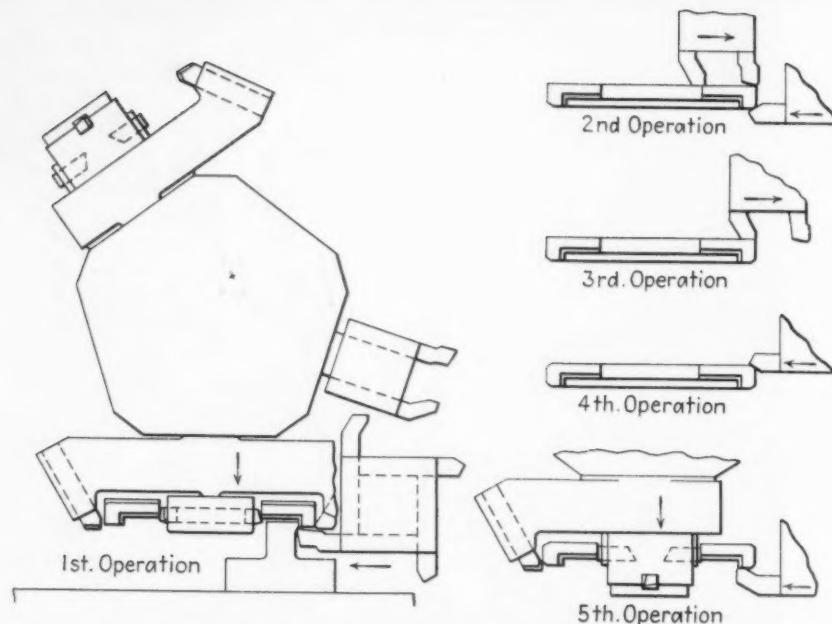


FIG. 3—Layout of tooling employed in new method. Operations are timed so that the main and side head tools function simultaneously at all times, thus eliminating lost time between cuts.

chuckings were required. The first operation comprised face, turn O.D. and undercut, rough bore 6-in. hole for finish. This required 14 min. The second operation comprised bore, counterbore, and finish bore 6-in. hole, requiring 18 min.

Larger Machine Employed

In the new method, a 36-in. spiral drive high-speed type vertical turret lathe is used in place of the 24-in. machine. The new method of group tooling includes additionally some of the operations previously done on the second chucking. Of course, this larger machine not only permits machining at higher speeds, but it also provides greater flexibility for handling of other work when required.

Fig. 1 illustrates the old method, with Bullard standard vertical turret lathe tooling, and Fig. 2, the new method of group tooling. It will be noticed that this group tooling is concentrated in the main head turret. Operations are so timed that the main and side head tools are functioning simultaneously at all times, as shown by the layout of tooling, Fig. 3. This eliminates lost time between cuts, as the side head tools are operating while the operator is indexing the main turret and vice versa. Two of the five main head turret positions are equipped with block-type tools, and the third is equipped with a standard tool holder using standard type of tools of the cemented-carbide type. Incidentally, the boring tool holder designed for one of these positions illustrates a fea-



FIG. 4—Use of helical type table drive gears designed to assure smooth transmission of power to the point of cutting is a feature of the spiral drive-type high-speed vertical turret lathes.

ture of these Bullard machines; namely, that large tools may be used without interference with the slide when indexing. The main head carries 10 tools and the side head carries four, all cemented-carbide tipped.

Wheel Rough Turned, Bored and Faced in First Operation

In the first operation the worm wheel is rough turned, and at the same time rough bored and rough faced on the under side, using both the main and the side turret heads. In the second and third operations

the gear is rough and finish faced across the top and chamfered on the under side. The first operation is done by a block-type tool holder having group tooling in the main turret head. In this group there are two turning cutters and two boring cutters, with a cutter in the side head doing the chamfering. For the second and third operations, the operator indexes the main or vertical turret head to bring into position the standard type tool holder, which is furnished with rough and finish cutters for facing across the top. At the same time tools in the side head chamfer the under side of the worm wheel. Chamfering the top of the outside of the wheel is done by a tool in the side head turret in the fourth operation.

For the fifth and last operation, the main or vertical turret head is indexed and another group-type tool block is brought into operation. This block is equipped with a tool for finish turning the outside diameter and with a boring bar having tools for true boring and reaming (the one shown in the illustration above the first operation block-type tool). The side turret head is also indexed to bring into position a tool for finish facing the under side of the worm wheel, which is done simultaneously with the finish ma-

ching operations by the main turret head.

New Method Saves 20 Min. Per Piece

The machining time for all operations by the new method on the first chucking is 3 min. and 41 sec., with the loading and unloading of the work, miscellaneous indexing of tools, etc., requiring additional time of about 1 min. This compares with 14 min. previously required on the 24-in. vertical turret lathe with the previous type of tooling. In the second chucking of the previous method, operations were bore and counterbore and finish bore 6-in. hole.

Inasmuch as the first chucking of the new method has absorbed some of the operations which were originally done on the first chucking of the old method, it follows that there would be a material reduction of time in the second chucking of the new method. Therefore, it is seen where the second chucking of the old method took 18 min., the second chucking of the new method now takes approximately 7 min. This shows a total saving of time by the new method for both chuckings of an average of 20 min. per piece.

It is estimated that with the saving in time above cited, tooling would be paid for in two years on the basis of 1000 pieces. Standard tool bits can be used in the side head with special and standard cutters for the main head. If production quantities are greater, the tools will pay for themselves that much sooner;

o o o

FIG. 1—In the previous method of turning, facing and boring the alloy bronze feed worm wheels used on Bullard Multi-Automatics, a 24-in. vertical turret lathe was employed, and two chuckings were required.

that is, if 2000 pieces a year, the new tooling would show a profit after the first year as compared with the previous layout.

Rough boring in the first operation and finish or true boring in the fifth operation are done at surface speeds of 160 ft. per min. Turning, facing, and chamfering in the second, third, fourth and fifth operations are done at a surface speed of 330 ft. per min.

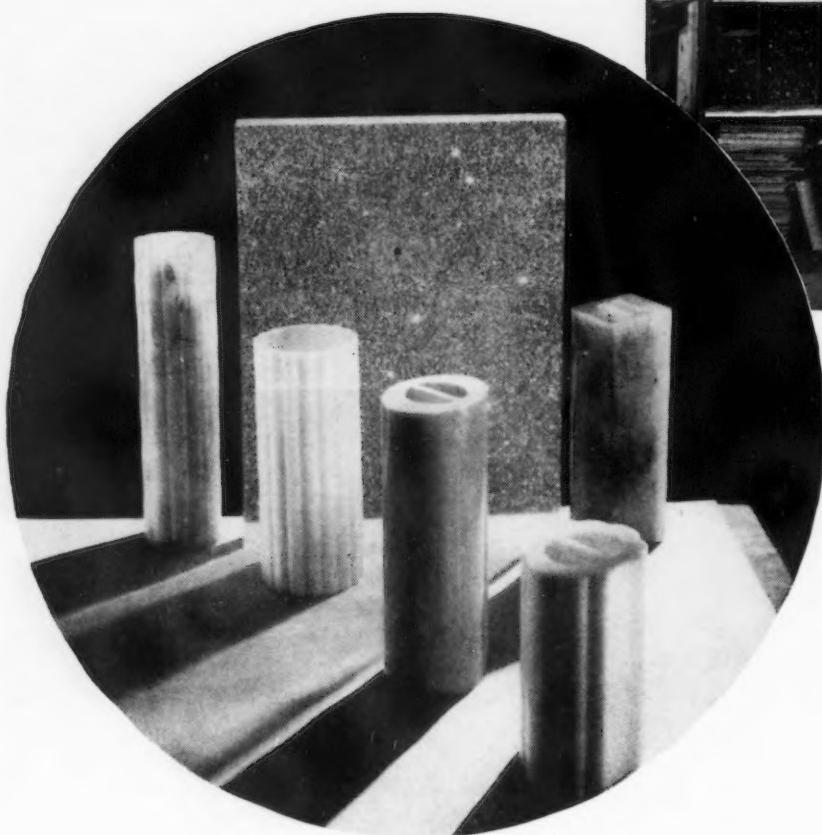
Complete Motorization a Feature

The 36-in. high-speed spiral drive type vertical turret lathe now employed is powered with a 30-hp. multi-speed A.C. motor. It has eight changes of feed, from 0.011 to $\frac{1}{2}$ in., and 12 table speeds, from 4.6 to 200 r.p.m. Individual motor drive is provided on these machines, each separately for revolving the table, rail raising, rapid power traverse, spindle lubrication and cutting lubricant; to this complete motorization is attributed the excellent performance of these

machines with cemented-carbide and other modern cutting tools.

As the name of the machine indicates, the gears in the entire table drive mechanism are of helical type, illustrated in Fig. 4, designed to assure a smooth flow of power at the point of cutting. The capacity is for work pieces 38 in. in diameter, 24 in. high under the cross-rail and 34 in. under the turret face. Vertical movement of the main head is 26 in. Accurately graduated scales are attached to the main turret slide, cross-rail face and side head slide, and index dials graduated in 0.011 in. are mounted on both main and side head feed rods. Observation stops having numbers corresponding with those on the faces of the turrets, and adjustably mounted on scales and dials, facilitate duplication of various sizes. Attachments adapting the machine for a wider range of usefulness include thread cutting and forming devices; fine feed and drum scoring attachments.





A CLOSE up view of several cast material sections and contours. The sheet stock shows a sprinkling of "star-dust." This effect is gained by the scattering of leaf silver in the material just prior to casting.

Production of Synthetic Resin Parts



CATALIN, which is a cast phenolic resin, has in seven years emerged from the laboratory and become a recognized agent in attaining pleasing effects in combination with metals in many manufactured products. Various forms of this type of plastic are shipped to users in cast form ready for manufacturing operations. These

forms include sheets, slabs, tubes, rods and bars of many different sections and colors. These shapes run in a number of lengths up to 20 in. and machine as easily as brass, involving practically the same toolings, set-ups and equipments.

Over 3,500,000 lb. of Catalin were produced in 1935 by its makers, the American Catalin

Co., at the company's plant in Fords, N. J. The company makes the different types of cast material only; it does no parts manufacturing.

Catalin weighs 0.048 lb. per cu. in., about one-sixth the weight of steel, and about one-half that of aluminum. Harmonizing or contrasting effects are available in almost any color, and in any de-



THE wide selection of stock materials and patterns available for Catalin parts production is illustrated in this view of a stock room.



ILLUSTRATING stock as fed to ordinary screw machine tools in the production of parts by common screw machine methods.

Parts on Standard Machine Tools

gree of transparency from clear water white to jet black, including a "star-dust" effect from the actual scattering of leaf silver throughout one type of the material. Because of its decorative quality, Catalin has become a familiar product in appliances of the home, office, among trimmings employed in the finish assembly of automobiles and for levers, handles and fittings for

machinery, gages, controls, and tools.

The cast stock is made from pure resin without a filler such as is common to the molded plastics. It has, however, many properties of the molded products, such as high mechanical and dielectric strength; freedom from corrosion; avoidance of necessity for finish applications; ability to take and retain a high

polish; resistance to water, oil and many chemicals; and sufficient hardness to avoid marring under conditions of constant use.

Catalin sheet, rod and cylinder production involves the operation of casting. Lead molds, formed by dipping steel mandrels into molten lead and then stripping the lead from the form, are utilized. Any shapes which lend themselves to

By L. M. WAITE
Associate Editor, The Iron Age

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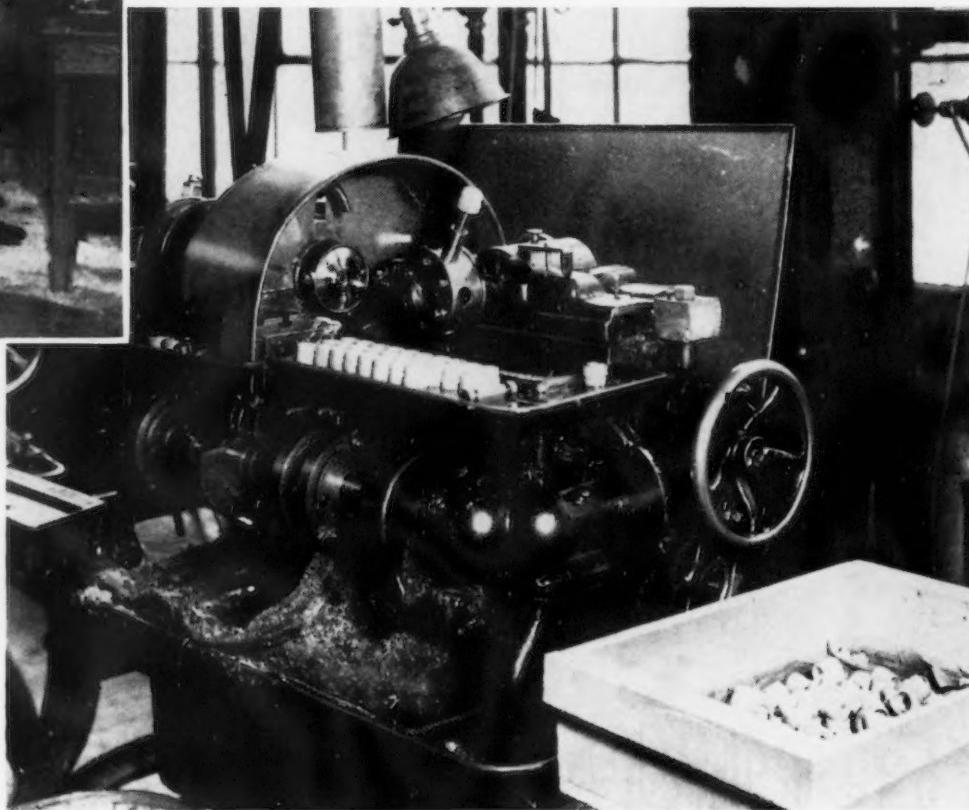
• • •



A BATTERY of automatic screw machines employed interchangeably on bar feed of either Catalin material or metal rods, bars or tubes. These at the plant of Casco Products Corp., Bridgeport, Conn.

• • •

A CLOSE up of one of these automatics as set up on a production job from this plastic stock.



such casting can be produced in lengths, ordinarily, up to 20 in.

Round cast shapes are stocked in diameters ranging from $\frac{3}{8}$ to $5\frac{1}{4}$ in. by about 20-in. lengths. Tubes are designated as "cylinders" and range from about 1 in. to $4\frac{1}{2}$ in. inside diameter and from $1\frac{1}{8}$ in. to $6\frac{1}{4}$ in. outside diameter, while in lengths they vary from 6 to 16 in. with wall thickness $3/16$ in. minimum. Standard sheets and slabs

range from $\frac{1}{8}$ in. to 1 in. in thickness and are commonly 12 in. x 24 in. or 18 in. x 50 in. in width and length respectively. Sheets as thin as $1/16$ in., and of larger area than above, are much used, and may be classed with stock sizes.

Regular machine shop equipment is used in producing parts from this material.

In quantity production of screw machine parts from Catalin, operations similar to those applied to metals, such as drilling, turning, threading, tapping, and milling, are performed under conditions involving only differently ground tools, and ranges of feeds and speeds adjusted to the requirements of the material. Much work is done dry, but coolants are employed when necessary in preventing excess heat

cuts and high speeds are best employed, and cutting edges should be in condition to produce long ribbon chips. Tool honing is of advantage for the smoothest cuts. Special grades of tool materials are not required, although many hard bronze tools are employed. These have an advantage in that they may be filed without removal from holders. Stellite or cemented carbide tools may be used when it is desired to get the longest possible runs without resharpening or resetting. Lathe tools should be set about 1 to 2 deg. above center. Cutting speeds of 200 ft. per min. upward are usually recommended. Both tool pressure and the cut should be light. For very high speed machining, a non-alkaline cooling solution is used; soluble oils are recommended.

which might cause discoloration or even brittleness of the outside surface. Centerless grinding is a common operation in obtaining extreme accuracy of outside diameters.

In turning and similar operations, tools are sharpened very much as for brass work. There should be plenty of clearance, 15 to 18 deg., and a zero or slightly negative rake is desirable. Light

For cut-off work with an abrasive wheel, a flood of water is employed, but as the clear materials are somewhat water absorptive, they should not remain in water for long lengths of time. Sawing is done at 1200 to 1300 ft. per min. or above. The saw may be of circular, jig or band type. The set of teeth should be just sufficient to permit proper clearance. Best finish results are obtained with 14 or

15 teeth per inch. In abrasive cutting, a 1/32-in. wheel, 10 in. diameter, with a phenolic binder, and running at 3750 r.p.m., gives splendid production. With jig saws intricate work may be done, as there is no grain to create a tendency for the blade to run out.

Certain grades of Catalin permit punching or stamping from thin sheets. With some exceptions this requires heating of the sheet and the tool. The operation is possibly best classified as cutting, as sharp edge tools are used. With stock intended for this purpose, parts up to $\frac{1}{4}$ in. thick are commonly produced.

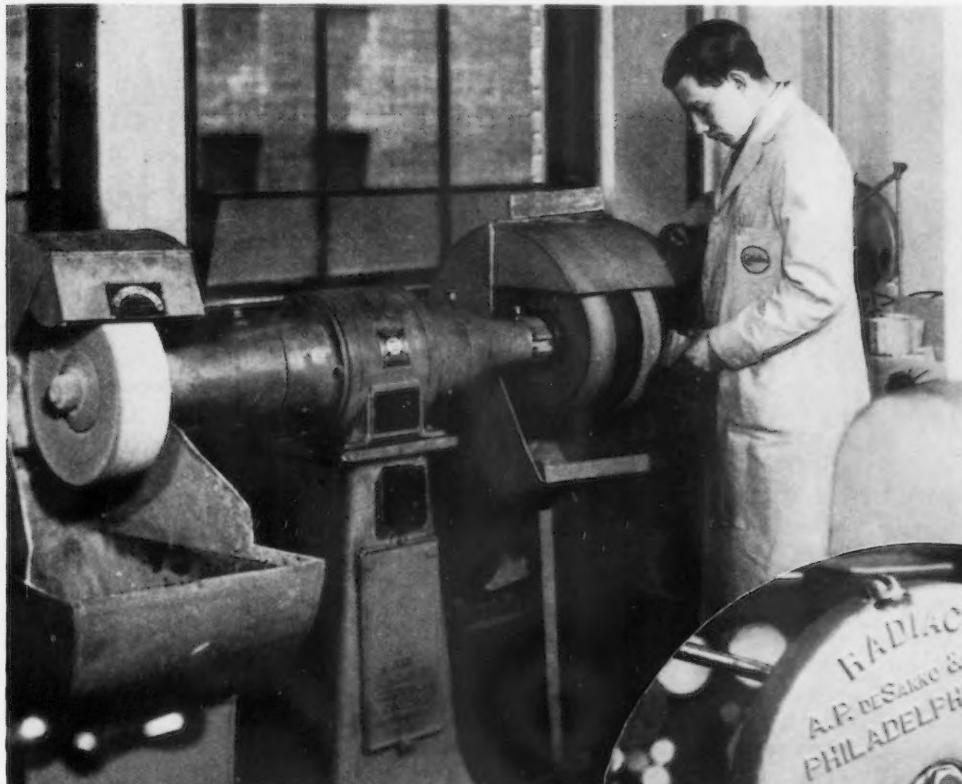
Cut surfaces have a dull frosted appearance which is easily polished by hand, machine or tumbling.

The carving of Catalin surfaces is readily accomplished with small abrasive cutters. Such work is generally hand-guided and operators become very expert and fast. The cut surfaces have a frosted appearance and are frequently so left to create a pleasing contrast with adjacent polished surfaces. Carving is usually done with rotary cutters and is a rapid operation.

Tumbling, as a polishing operation for small parts, is done in wooden barrels containing shoe pegs to produce friction, and pumice or some similar polishing agent or a very fine abrasive. If a very high polish is desired, the pumice is washed off and the parts are tumbled in damp hard-wood sawdust.

Cutlery handles afford illustration of the use of Catalin in large production. Castings are to size and have any desired taper. The large end is usually square, permitting whatever rounding or forming operations may be called for.

A drilling operation for the metal shank, over which the handle fits, completes manufacturing, up to assembly. At assembly, the handles, hole end, stand in water or water and glycerine, at 150 to 180 deg. F., for a few moments. This produces a sufficient "stretch" condition in the Catalin to allow assembly by a slight forcing of the handle. Shrinkage in cooling provides the grip to assure permanent assembly; no cement is used.



STANDARD polishing equipment provides a variety of wheels and buffs suitable for finishing products of many contours.

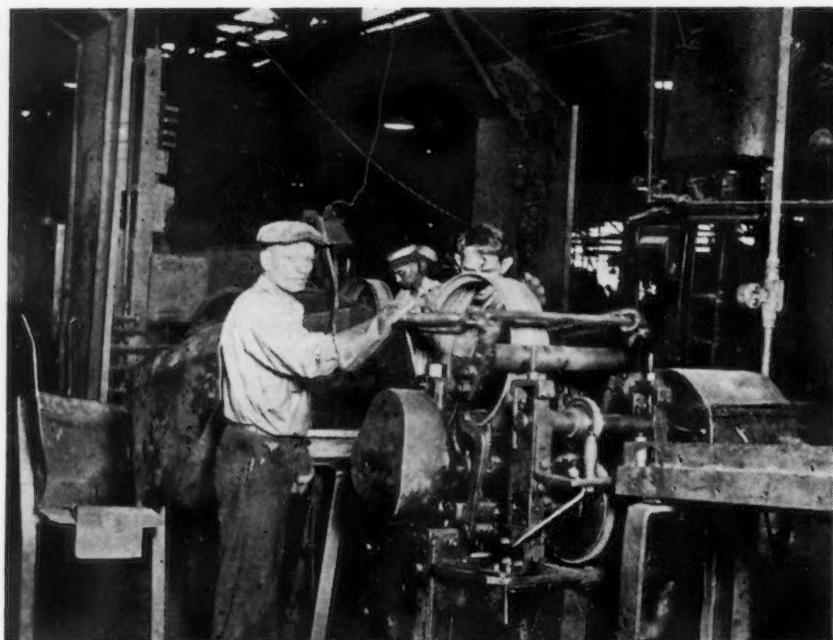
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THIS abrasive cut-off equipment for production work utilizes a 1/32 in. thick, 10 in. diameter, wheel running at 3750 r.p.m. The wheel and material are constantly flooded with water as shown. The operation is extremely fast.



bling processes. Flat surfaces can be sanded in much the same way as is wood; belt or disk methods can be utilized. If sand scratches must be removed, some polishing is required. "Ashing" is an operation to remove tool or grinding marks. It is a wet process and involves stitched muslin wheels and wet pumice of No. 0 or finer grade. These wheels or buffs are usually of 3 to 4-in. face, 12 to 14 in. diameter and run at about 1750 r.p.m.

• • •
FIG. 1—After being sheared to length, the flat rim stock is rolled into a circle and marked on this three-roll bender.
• • •



Accuracy Demanded in

By FRED B. JACOBS



MOTOR vehicle rims designed for heavy duty, as used on trucks and buses, are cold rolled into circular form from hot rolled shapes as they come from the rolling mill. The object of using shaped stock is to minimize the amount of cold working necessary and to preserve the strength of the section to take care of the heavy loading, impact and inertia forces for which high-speed motor vehicles are designed. There are many varieties of motor vehicle rims, both solid and split. For passenger cars the drop center rim made from strip steel is the prevailing

construction, while a typical heavy vehicle rim might consist of a rim base, side ring and locking ring.

Motor vehicle rims must be made to meet accurate specifications. The welded joint must be as strong as the remainder of the rim, and the rim must be a true circle so that the heavy tire with which it is equipped will be in balance. Definite standards formulated by the Tire and Rim Association are followed closely for dimensions and tolerances. Rim dimensions are, of course, very important from the standpoint of tire manufacturers.

Thus the motor vehicle rim maker is confronted with a number of problems the majority of which, aside from the accuracy necessary, pertain to maintaining high production schedules. This article illustrates and describes a few of the principal production operations followed at the plant of the Firestone Steel Products Co., Akron, Ohio.

FROM the standpoint of tire makers, motor vehicle rim dimensions are very important, and in the manufacture of rims definite standards as to dimensions and tolerances are followed

Motor vehicle rims lend themselves admirably to straight line production, which method is followed at the plant in question. The rims shown in the various illustrations are of the three-piece variety truck type, welded construction.

Stock Pickled, Sheared and Circled

The shapes for various rims as they come from the rolling mill are unloaded at a dock at one of the production lines, railroad sidings running directly into the docks. The shapes come in bundles



FIG. 2—Ends of the rim stock are joined by butt welding. The welded joint is as strong as the remainder of the rim material.

in Motor Vehicle Rims

closely. Steps in the production of one type of heavy-duty rim, together with operations in making templates, rolls and other tools used in the production process, are here described by Mr. Jacobs.

of several hundred each and are stored on the docks until ready for use. The first step in manufacturing consists of pickling to remove mill scale, an automatic pickling arrangement being used. The shapes are loaded on to swinging arms on conveyor chains which carry them through the pickling bath, then through a cold water rinse, followed by rinsing in hot water. The entire operation is automatic with the exception of loading and unloading. Acid fumes are carried away by an exhaust system.

The next step consists of shearing the stock to length. This operation is performed under a shear press fitted with blades conforming to the shape of the raw material. From the shearing press the stock is passed to the circling operation shown in Fig. 1. Here it passes through a three-roller bender having rolls shaped especially for the type of rim in production. The rolls are set at correct center distances to roll the flat-shaped bar into a circle. Once the machine is set up it will run continuously without further attention aside from loading. This machine also automatically stamps the product with its correct specification marking, after which the rim is ejected into a chute.

Butt Welded and Flash Sheared

The welding operation is shown in Fig. 2, the equipment being a heavy-duty butt welding machine. In this operation the rim is firmly

clamped in shaped jaws which then are brought together. Moving of the jaws to bring the ends of the rim together applies the current and results in a welded joint that is as strong as the remainder of the rim material.

Then the rim is formed for a distance of 2 in. or so from each side of the welded joint. This operation is done under a heavy press. The object of this flattening is to facilitate the next operation called burr shearing which trims away the flash left by welding. With the rim firmly clamped in place between rotary cutters, one on the inside, the other on the outside of the rim and both conforming to the rim shape, the cutters make one revolution each, which trims away the flash marks left by welding.

Some types of rims must be ground after burr shearing. For example, it sometimes is not practical on account of a specified

shape to burr-shear the two edges or sometimes down a vertical edge. Thus grinding is sometimes necessary, as shown in Fig. 3, one operator grinding the outside and another the inside portion of the rim. The wheels used for this operation are 14 in. in diameter, 1-in. face, 36 grit, rubber bond, operated at a surface speed of 8000 ft. per min., which comparatively high speed is necessary to make rubber bond wheels cut correctly.

The next operation is called coining and is done under a heavy-duty hydraulic press capable of exerting a pressure of 300 tons. However, the maximum pressure is not always necessary. The dies of the coining press conform exactly to the rim shape and as they come together with the rim between them, the enormous pressure flattens any high spots so that after the rim is finished it is difficult to find that joint. The coining operation is shown in Fig. 4.

Expanding and Rolling Operations

After the rims have been coined they are expanded slightly on the machine shown in Fig. 5, which, as may be seen, is equipped with several dies arranged about a tapered center. With the rim in place over the dies, the tapered center moves downward, being actuated by a connecting rod from a heavy crank driven by a large spur gear. This

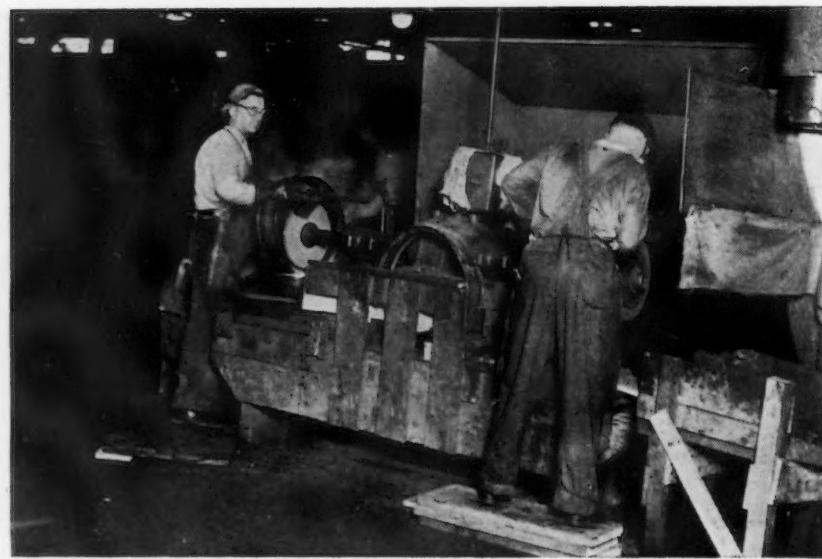


FIG. 3—On some rims the burr is removed by grinding. One operator grinds the outside and the other the inside.

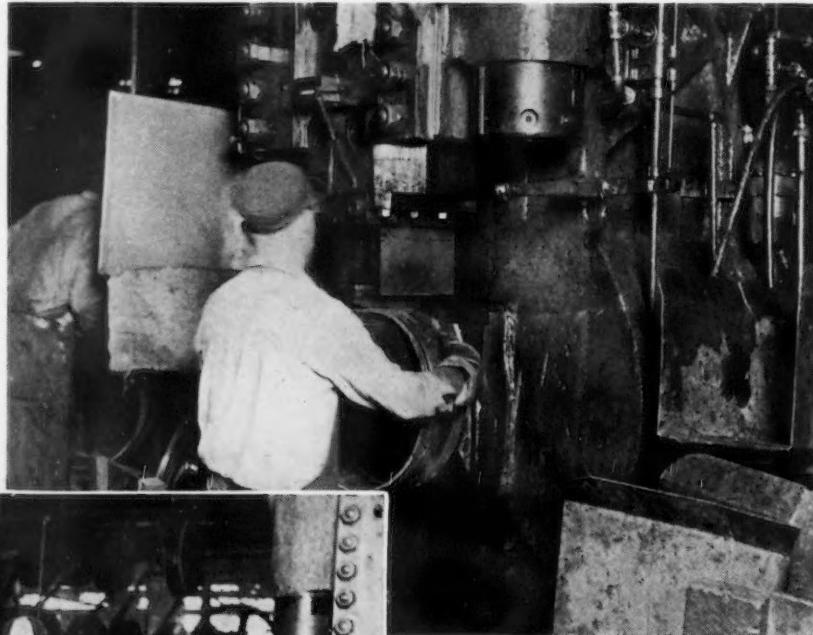


FIG. 4—High spots are so flattened that it is difficult to find the joint in the finished rim.



FIG. 5—After being coined the rims are expanded slightly in this machine, which is capable of exerting pressures up to 200 tons.

gear is driven by a train of gears from an individual drive electric motor. The machine is capable of exerting pressure as high as 200 tons to expand the rim to the size desired for the ensuing operation.

The next operation, pictured in Fig. 6, consists of rim rolling, where the rim rotates between two rolls, the lower one on which can



FIG. 6.—In this operation the rim is rotated between two rolls, the lower one of which can be moved downward for loading and unloading.

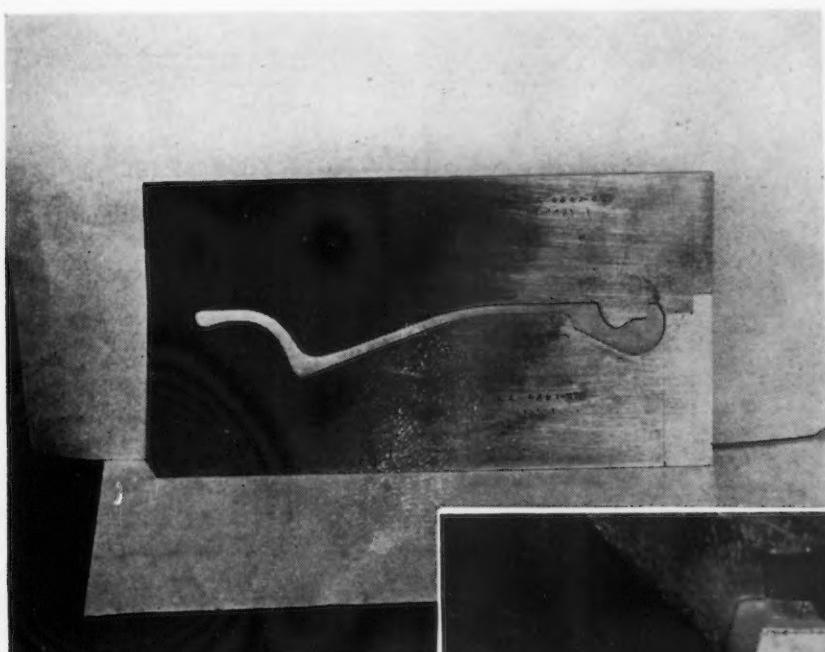


FIG. 7.—Master templates for gaging each side of the shape are among the special tools used in the manufacture of motor vehicle rims.

• • •

be moved downward for loading and unloading. Some rims can be rolled in one operation, others require two operations and still others three operations in the case of complex rims. In a simple rim-rolling operation the rolls conform exactly to the rim shape. In a three-stage rolling operation, however, the rolls do not fit the shape,

as the problem of designing these rolls is similar to that of designing drawing dies for press work. The stock is brought up in such a manner that the final rolling operation brings about the correct top and bottom contour.

Another expanding operation follows rim-rolling, the object of which is to prepare the rim for the final sizing operation. This brings all the rims to the final sizing operation in exactly the same condition. It is also required to present a desirable contour to the final sizing operation so that each finished rim of a given type will be exactly alike.

Following the second expanding operation the rims are subjected to shrinking, or tire setting. Here the rim is housed in dies which surround the outside. Having been subjected to several operations, such as rolling, expanding and shrinking, the rim is in a condition to hold its shape permanently.

While the foregoing outlines the principal operations followed in making one type of rim on one production line, various other products are made in this plant. For example, the side and locking rings used in three-piece rim construction call for methods quite similar to those described. Light truck rims and drop center type rims for pleasure vehicles do not call for complicated production processes,



FIG. 8.—Templates must conform to master gages, fitting close enough to exclude light when viewed as shown.

since such rims may be made from flat stock fed into circling machines, automatically stamped, circled and discharged from the machine without additional help.

Templates for Gaging Each Side of Shape

Manufacture of motor vehicle rims calls for a large quantity of special tools, which include templates for testing shapes, rolls for rolling the rims, dies for welding,

to exclude light when viewed as shown in Fig. 8, where the template and gage is placed on a ground glass with a strong light underneath. The accurate fitting necessary must be done by hand-filing, and it represents a class of high precision gage-making.

Rolls Precision-Ground

Rolls used for rolling rims are made of alloy steel, turned to shape, heat treated, and finished by

formed face wheels. Angles are ground readily by setting the wheel-head platen over the desired number of degrees. This work is precision grinding of a painstaking nature wherein skill is developed only through long practice. The roll face must, of course, be ground to fit a template very accurately so that no light shows through. In addition to grinding new rolls, this process is employed for repairing rolls that have been worn out of shape through continual use.

The various dies for welding, coining, etc., are ground to shape on surface grinders, the work being made to fit templates provided for the purpose. Thus grinding enters prominently in keeping the various special tools in proper shape.

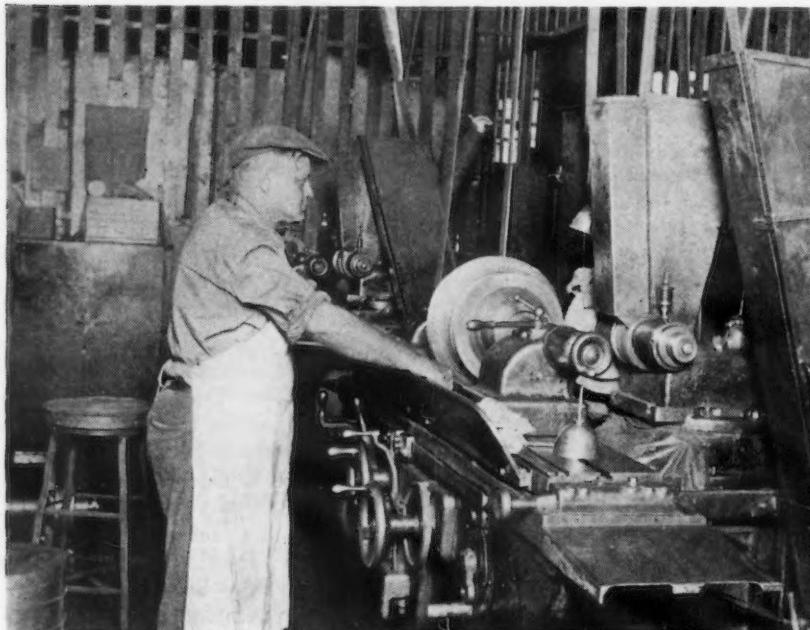


FIG. 9—The heat-treated alloy steel rolls used for rolling rims are finished by grinding on this 14 x 48-in. universal grinder machine.

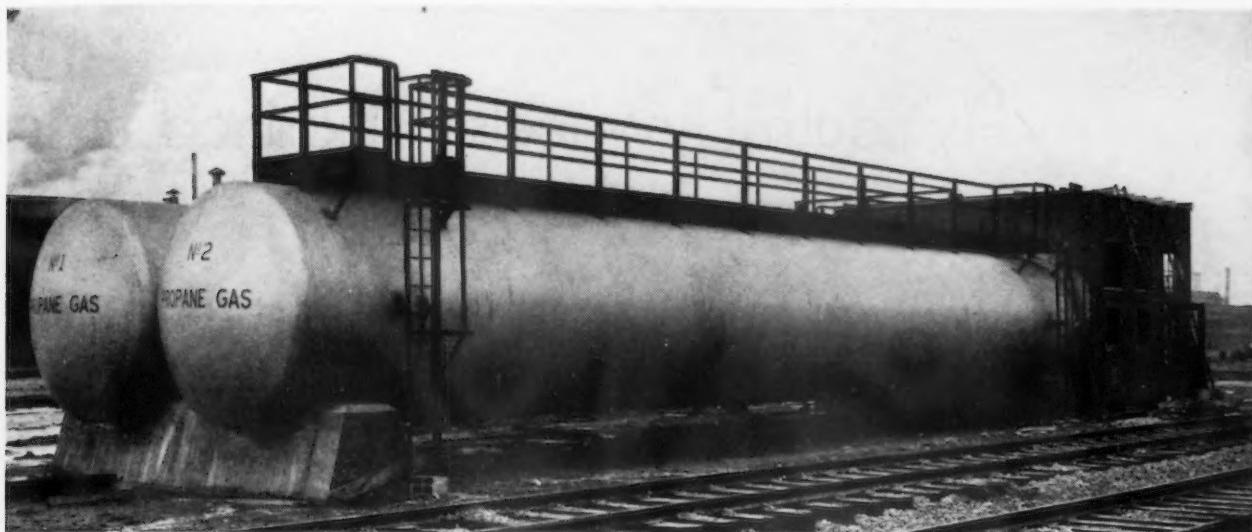
coining, etc. In Fig. 7 is shown a pair of master templates or gages, male and female, one for gaging each side of the shape. There also must be provided templates for the rolling mill and templates for testing the various rim-rolling operations. These templates are made of high-grade tool steel. The design is laid out very carefully by means of a height gage and from intersections thus determined the radii are struck. The outline then is cut on a nibbling machine, leaving about $\frac{1}{16}$ in. for finishing by filing on a die-filing machine. The latter is fitted with a magnifying glass mounted on a light socket, and by looking through this glass the toolmaker can work close to his lines. In making templates for testing the shapes, they must conform to the master gages, fitting close enough

grinding as shown in Fig. 9. This machine is a universal grinder accommodating work 12 in. in diameter and 48 in. long, fitted with a manufactured alumina wheel 14 in. in diameter, 36 grit. Width of the wheel depends on the work at hand, and it may range from $\frac{1}{2}$ to 2 in. The wheel is run at a surface speed of approximately 5000 ft. per min., while the work speed may vary from 15 to 40 ft. per min., depending on the nature of the work.

From a position in front of the machine the operator cannot always see the wheel, due to the size of the work. He judges how it is cutting entirely by the sound. The necessary convex curves on the roll face are generated by feeding the wheel over the work by hand, which calls for considerable skill. Concave radii can be generated with

Glass Fiber Employed In Air Filtration

A NEW type of glass air filter for internal combustion engines, air compressors, warm air furnaces and ventilating units are so designed that when laden with dust, mechanical operation of equipment will stop, as an automatic indication of replacement time. Primarily, the filters consist of a series of bonded mats of flexible glass fibres confined on intake and discharge faces by expanded metal grilles; inclosure is by fibre-board frame. The equipment is manufactured at the Newark, Ohio, plant of Owens-Illinois Glass Co., Toledo, Ohio. The mats of glass fibre are coated with an odorless, fireproof, non-evaporating and non-corrosive chemical and physically retain all manner of particles carried by passing air. The pack at the discharge end of the filter is of greater density than is the pack at the intake end to insure retention of the finer dusts. The air load is evenly distributed over the entire filter face at all times. It is said that these "Dustop" equipments will gather loads up to eight pounds. Filter weight is two pounds.



Ford Installs Propane Mixing Station

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THE Ford Motor Co. has recently completed an installation of six propane tanks with a capacity of 30,000 gal. each in order to enrich its blast furnace gas. Two of the new tanks are shown in the illustration. The propane, which is a liquefied hydrocarbon, is kept under pressure and is distributed through vaporizers yielding 900,000 cu. ft. of propane gas per tank, or a total of 5,400,000 cu. ft. from the six tanks. Together with the blast furnace gas,

the new mixing station will be able to provide about 30,000,000 cu. ft. daily of mixed gas at power loads, should the occasion demand.

Propane has a heat value of 2500 B.t.u. to the cu. ft. and is mixed with blast furnace gas having a heat value of 100 B.t.u. per cu. ft. By mixing the two at a 1 to 5 ratio, a mixture is obtained having a heat value of about 500 B.t.u. per cu. ft. In the installation which was recently completed, there are six or eight vaporizers in the mixing station, which change the liquefied hydrocarbon to a gaseous form, and a machine for mixing propane gas and blast furnace gas. This machine also can be used for mixing propane gas and air when blast furnace gas is not available.

In order to achieve the desired volumetric mixing the pipe system in the propane-blast furnace gas mixing machine is equipped with

pressure regulators operating butterfly valves under calorimeter control. For mixing air and propane gas there are two displacement pumps connected by a fixed drive shaft. Ford engineers have made the mechanism proof against an explosive mixture of propane gas and air by setting it up to be driven by the propane gas under pressure. Such mixers ordinarily are given by motors, and unsafe mixtures may result when the operation is not regulated by the flow of the gas.

The gas will be conveyed from the blast furnace department by a new 5-ft. main about 600 ft. long. Its pressure will be raised at a booster station which will also house the supervisory control system. By manipulating switches and buttons, the dispatcher operating the supervisory control board will be able to maintain a balanced load condition throughout the plant.

Plymouth Flywheels Machined at Rate



PLYMOUTH flywheels are machined completely in two operations by a battery of two Gisholt radial slide Simplimatic lathes. These two machines replace three in the previous layout, and increase production from 18 to 44 flywheels an hour, floor-to-floor time.

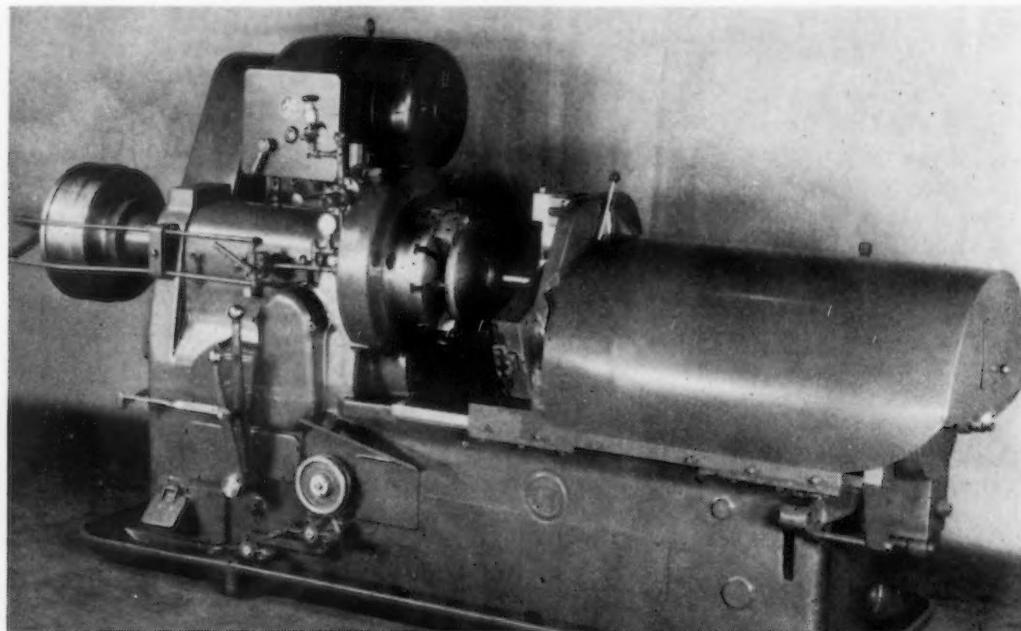
Only one operator is required for the two machines, and although considered only a rough-

ing operation, the flywheels are held to close tolerances.

These results are attributed to a new design which permits the maximum number of cutting tools to cut simultaneously at high speed. A new, special tool carriage with a vertical face, on which the tool slides are mounted radially to the work, supplants the previous flat table principle, which utilized only one plane for cutting. The new tool carriage brings the tool slides

individual cams located in the base of each slide. Hardened steel cam segments bolted to the master cam control the movement of each tool slide. This arrangement makes for versatility in that cam segments can be changed when needed to provide different feeds or timing of the respective slides when tooling up for another job.

The machining cycle is entirely automatic, the operator having to move only one lever. The carriage



RADIAL-SLIDE Simplimatic lathe toolled for machining Plymouth flywheels. Increased production is attributed to new design which permits the maximum number of tools to cut simultaneously at high speed. A special tool carriage with vertical face, and a single drum-type master cam are new features.

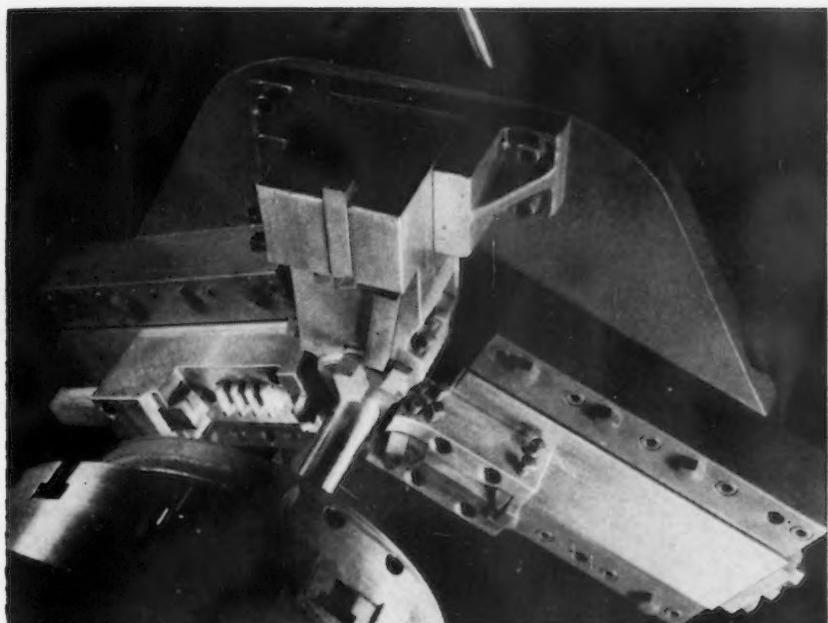
up close to the work and permits the tools to be presented to the working surfaces without interference or overhang.

Single Drum-Type Cam Employed

A single drum-type master cam actuates the movement of the tool slides. This is also a departure from the previous method of moving the various tool slides by

or master slide holding the tool blocks is rapid traversed to within $\frac{1}{4}$ in. of the work by means of an air cylinder, a drum type cam then continuing the feeding of the tools to the required depth. The tooling on both machines is similar in general arrangement. It includes a central boring and turning slide feeding longitudinally and also two radially disposed slides having traverse feeds for facing, recess-

te of 44 an Hour in Two Operations



TOOLING includes a central boring and turning slide feeding longitudinally and also two radially disposed slides having traverse feeds for facing, recessing, forming and chamfering. The carriage or master slide holding the tool blocks is rapid traversed within $\frac{1}{4}$ in. of the work; the drum type cam then feeds to the required depth.

ing, forming, and chamfering. At the completion of the cut, the slides return automatically, the master slide is quick traversed also to the starting position, and the spindle is automatically stopped, leaving the machine ready for unloading and reloading.

Carbide and J-Metal Tools for Roughing

Tungsten-carbide and Stellite J-metal tools are used in these roughing operations, removing approximately $3\frac{1}{32}$ in. stock. The cutting speed is approximately 200 ft. per min., which is reduced to 100 ft. per min. for the final shaving operation. Feed of about 0.030 per revolution results in an excellent tool life between grinds.

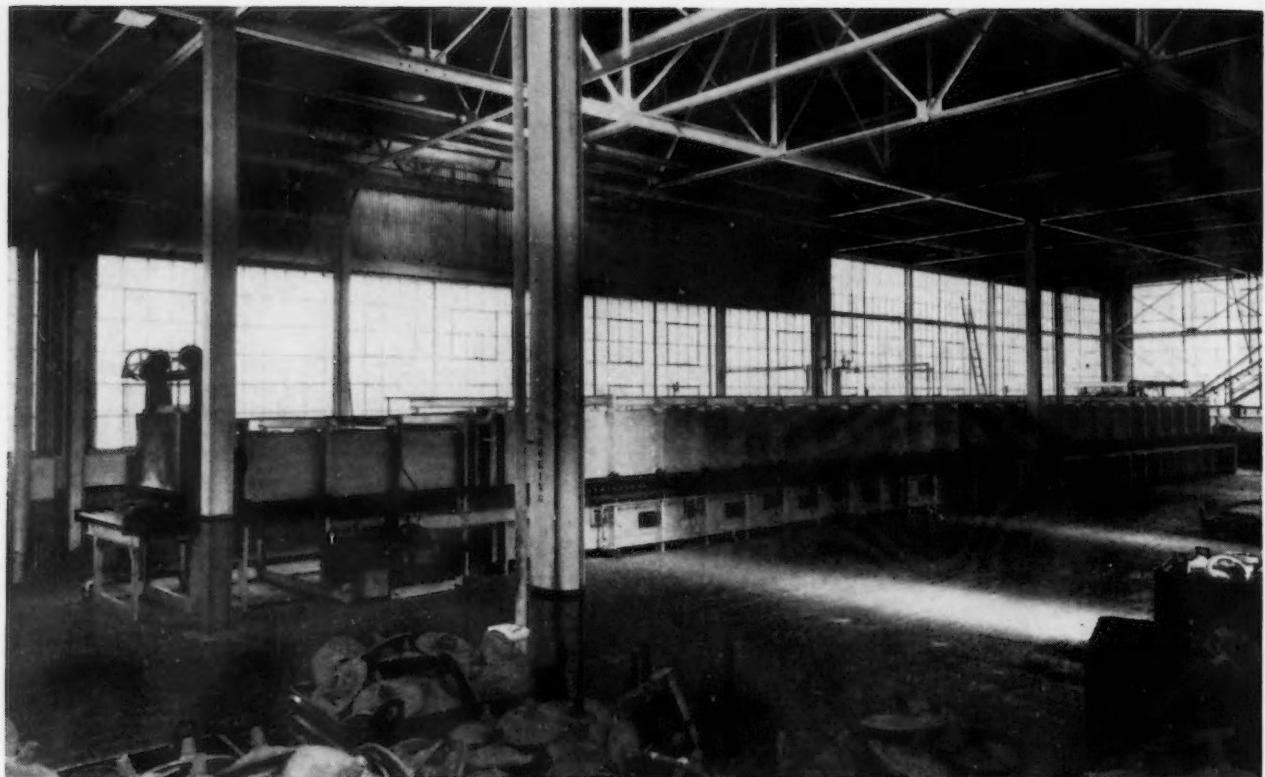
On each machine the flywheels are held in a three-jaw, air-operated chuck. They are located on three pins in the chuck face and are clamped on the outside

diameter. Metal removal is so rapid that a 16 in. air chuck cylinder is required to hold the work securely in place. It is stated that the safety factor is greatly increased on these machines because the spindle does not revolve until the cutting tools are within $\frac{1}{4}$ in. of the work and is stopped as the master slide is quick traversed from the work. The starting lever is at the top of the master slide remote from any revolving parts.

Automatic lubrication is provided for every important bearing and working surface on the machine. The whole master cam feeding system is enclosed in a single housing and runs in a bath of oil. Carriage ways and individual tool slide ways are oiled from a central reservoir by a force feed system. A pump in the headstock pumps the oil from the lower reservoir to a reservoir located at the top of the headstock. Tubes leading from this reservoir distribute the oil over the gears and

to the bearings. This arrangement allows dirt to settle out in the upper reservoir, only clean oil being distributed to the various parts.

The bed and headstock, cast from nickel semi-steel, is a rugged and heavily braced casting. Headstock walls extend well above the spindle, surrounding the spindle bearings with solid support. Heavy cross ribs inside the headstock provide center bearing seats and supply the strength required to maintain shaft alignment. Full-length hardened-steel plates are attached to the bed ways and then ground in alignment with the spindle. Tool-slide bearings are wide and are also surfaced with hardened steel plates. These hardened steel plates test approximately 72 Scleroscope or 55 Rockwell. Chip removal facilities are provided at the rear of the machine, as shown in the rear-view illustration. The chips are carried by a chute to a cast pan, bolted to the bed, from which they can be removed conveniently.



THIS continuous-type oil-fired annealing furnace is 110 ft. long and is divided into three separately and automatically controlled zones.

Kelsey-Hayes Melts Iron and Steel In Brackelsberg Units



FOR the past several months the Kelsey-Hayes Wheel Co. has had in operation one of the largest Brackelsberg furnace installations in the country and the only one of its kind in the city of Detroit or the vicinity. These units, in conjunction with an electric furnace, have been melting gray iron and alloy steel for brake drums and flanges and composite drums and flanges. At present four Brackelsberg furnaces are in use and a fifth is in the process of installation. Three of the furnaces melt alloy steel for complete brakes and

By FRANK J. OLIVER
Detroit Editor, The Iron Age

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integral flanges and hubs, and for flanges and hubs only. The other furnace, plus the electric furnace, melts gray iron for brake drums. Two complete mold conveyor systems and sand handling equipment complete the installation.

These Brackelsberg melting units, which are made by the Whiting Corp., are in the form of an elongated cylinder whose length of 24 ft. is roughly four times the

outside diameter. The furnaces are charged from the end by inclining the axis of the cylinder about 45 deg. A hopper car travels on tracks on a mezzanine deck and serves all units. In its normal, horizontal operating position, the furnace is rotated on trunnion rollers so that the roof of the furnace in the next half turn becomes the hearth. Thus, the charge is heated by direct contact with the heated brick, by radiation from the roof and by flame contact. The fuel is powdered coal which is blown through the furnace from the charging end and exhausted at the back through a

cylindrical connecting member to the stack. This connecting member is brick lined and is mounted on wheels so that it can be rolled to the side when it is necessary to tilt the furnace for charging.

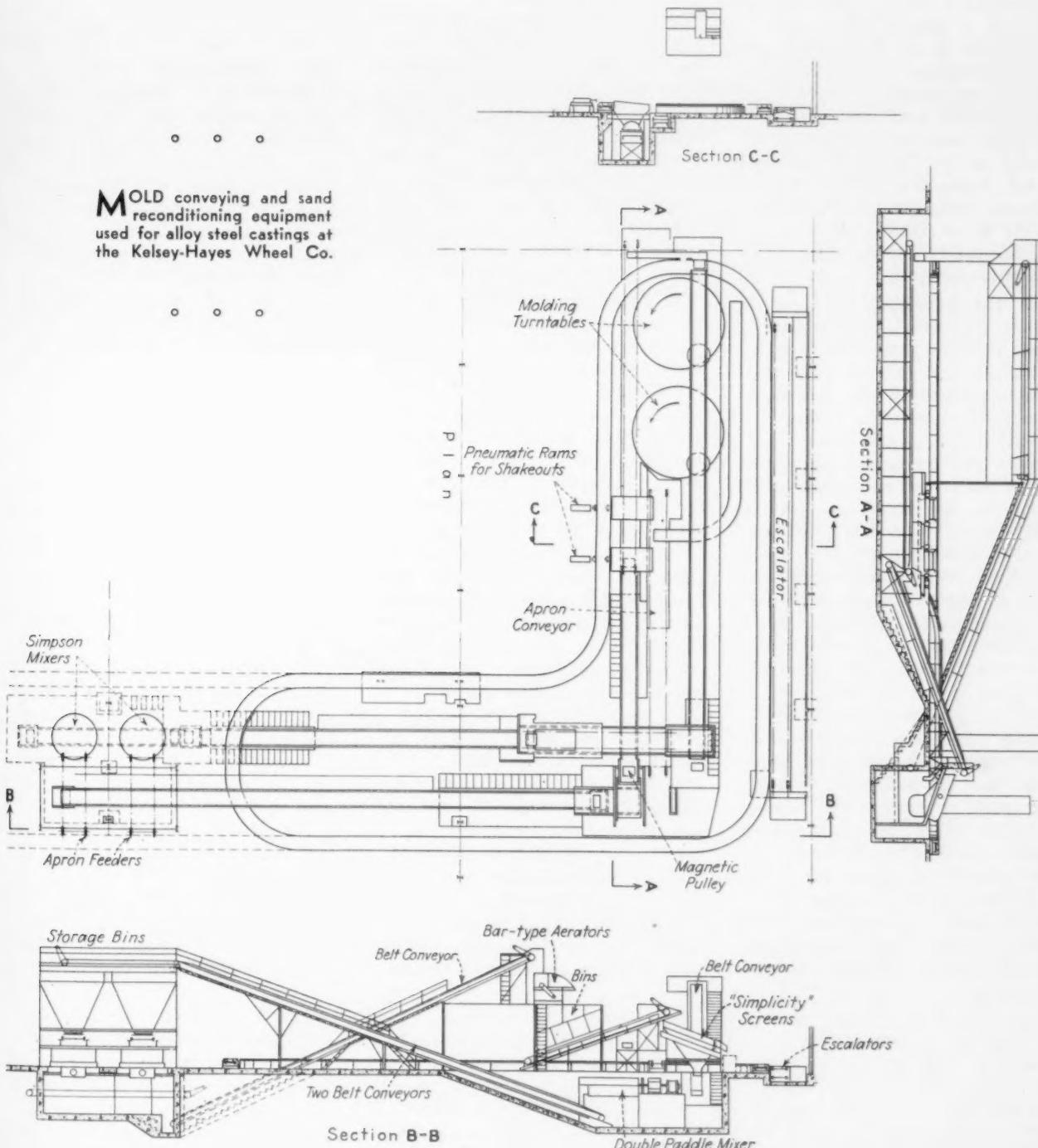
Bituminous coal is stored in 6-ton hoppers beside each furnace unit and is fed directly to a motor-driven pulverizer and blower. In order to obtain the high furnace temperatures required for melting

high-test iron or steel, the input air is pre-heated through absorption of heat from the flue gases in the stack. Through the use of pre-heated air for combustion, the flame temperature can be raised to 3150 deg. F. if necessary, although the usual temperatures now being attained in the Kelsey-Hayes foundry are between 3050 and 3100 deg. F. The higher temperatures are desirable in melting steel scrap

employed in the copper-silicon alloy steel melting units.

Once the furnace lining is up to heat, the melting time from cold metal either in the form of scrap or pig iron is about 95 to 100 minutes. The furnaces are lined with silica firebrick 15 in. thick and the usual life of the lining is 200 heats. By keeping furnaces out of phase with each other, it is possible to supply a continuous mold conveyor

MOLD conveying and sand reconditioning equipment used for alloy steel castings at the Kelsey-Hayes Wheel Co.



with hot metal even though the metal is melted in batches.

Two procedures are used in tapping furnaces; either tapping into an 8500-lb. teapot spout ladle, from which the metal is then poured into 800-lb. individual trolley crane ladles, or else pouring directly into the small ladles through a spout on the side of the drum. During the cold melting period this spout is plugged with fire clay in the usual way.

The electric furnace used in the Kelsey-Hayes Wheel Co. installation is a Moore rapid melting unit made by the Pittsburgh Lectromelt Furnace Corp. It is a top-charge type permitting the roof to be pulled back and tilted for charging cold metal. Nominal capacity is 10 tons per hr. Hot metal from this furnace is discharged into a large ladle car from which it is drawn off into the 800-lb. trolley ladles which serve the mold conveyor.

In the line drawing, there is shown the layout for the Jeffery mold conveyor and sand-handling equipment for pouring alloy steel brake hubs and flanges. The gray-iron mold conveyor is similar, except that it is shorter because less cooling time is required. Copes and drags are molded on the two 16-ft. turntables and are closed on the mold conveyor immediately adjacent. A new swing-type Beardsley & Piper "Sandslinger" unit suspended from a universal swivel joint serves each turntable. These impeller blast machines automatically ram the flasks mounted on the stripping plates as they are rotated into position below the spout. Closed molds are carried by the conveyor to the pouring zone, where they are poured from a moving escalator which keeps in step with the mold conveyor. After cooling, the flasks reach the vibrating shake-out machines, onto which they are pushed by air cylinders. At this point the empty flasks are placed on a flask return conveyor of the gravity feed roller type, and

are delivered back to the molding turntable. The castings themselves pass from the shake-out onto an apron conveyor from which they are hooked by hand and hung on an overhead trolley conveyor. They are then delivered to the cleaning room, cooling en route.

The sand from the shake-out passes through the grates onto an apron-conveyor which also receives strike-off and slippage sand from the molding turntables. This apron conveyor delivers the hot sand to a 24-in. belt conveyor at the head end of which is a magnetic pulley for removing shot and miscellaneous ferrous material. The cleaned sand drops from here to an eccentric-type vibrating screen which reduces the lumps and drops the cleared material onto a paddle mixer for preliminary tempering, mixing and cooling. Sand discharged from the paddle mixer is carried into two 40-ton storage bins by a belt conveyor.

Apron-type conveyors under these storage bins dump sand in 2-ton batches into the Simpson muller-type mills, where the sand is further tempered. Here the proper moisture content is adjusted. Although batch-type mixers are used, a continuous flow of sand is maintained in the system by means of equalizing hoppers above and below the mixers.

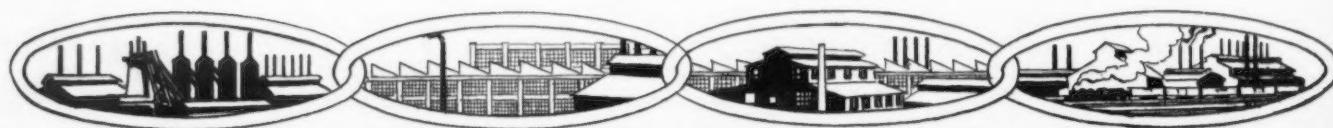
Sand delivered from the Simpson mills is carried by inclined belt conveyor to another conditioning unit which aerates, blends and further cools the sand before delivering it into a 20-ton storage bin. Before being carried to the 2-ton bins located over each turntable, the sand is further aerated by means of a vibrating screen. From these small bins the sand is fed by means of disk feeders into the two sandslingers over the molding turntables. Excess sand is delivered over the head end of a belt and into a chute back into the apron conveyor which collects the excess material from the turntables. Each sand handling system has a capac-

ity of 60 tons per hr. and, together with the mold conveyors and shake-outs, is designed to handle about 225 flasks per hr.

At each shake-out and at each sand-conditioning plant, as well as in the core sand-mixing plant, there are dust collecting systems connected up with nine Schneible multi-wash wet dust collector towers. In these towers dust is introduced below the bottom impingement plate where heavy particles fall into a settling cone. The lighter particles, as they rise in the tower, are caught by the impingement spray and washed back into the cone. Sludge from the settling cone is pumped by a lead-lined pump into a multi-louver de-watering tank where the sludge is reduced to 12 per cent moisture content.

The photograph shows a continuous roller-hearth-type furnace, located at the end of the foundry, which is used for annealing these brake drums and hubs. The overall length of the entire equipment, including extension tables, is approximately 110 ft., of which 38 ft. is taken up in the heating and soaking chambers and 40 ft. in the slow cooling chamber. The furnace is heated by means of low-pressure oil burners located on both sides of the heating and slow cooling chambers. Burners for the heating-up chamber are divided into two separately and automatically controlled zones. The soaking section is also an automatically controlled zone, as are the two sections of the slow cooling chamber.

Capacity of the annealing furnace is 240 complete brake drums per hr. The drums are loaded four high and four wide directly on a sprocket-driven roller extension table at the charging end of the furnace and are conveyed on heat-resisting alloy rolls through the furnace. The rollers are placed on approximately 5-in. centers and are motor-driven through a variable-speed transmission. The equipment was installed by the Electric Furnace Co., Salem, Ohio.



The Metallization of Machine Elements

By W. E. GLIDDEN
*Metallizing Engineering Co.,
Chicago*



METALLIZING is a method of spraying molten metal so that it will adhere to practically any solid base. The metal, in wire form, is automatically fed into the hot zone of an oxyhydrogen or oxyacetylene flame which causes a globule of molten metal to form continuously on the end of the wire. This molten drop is atomized by a blast of air, and the particles are driven forward and at a high velocity impinge on the surface to be coated.

The action is entirely automatic since the feed rolls have sufficient power readily to pull the wire from a 12 or 15-lb. spool of metal, and the speed of the turbine can be regulated by varying the amount of air passing through the by-pass valve.

The fine droplets of metal are urged forward by the air blast at

velocities which vary from 500 miles an hour on up to about 760 miles an hour, depending on the type of blast used and on the metal being sprayed. The average of these velocities is of the same order as the muzzle velocity of a low-powered rifle bullet. Of course, the kinetic energies of these small particles are very small, but at a distance of 5 in. the velocity is sufficiently rapid to result in a complete flattening of the particle when it strikes a surface.

In traveling through the air, the particles are streamlined in shape. They may not be molten, due to the cooling action of the air, but they are more than likely in a definitely plastic condition, especially in the case of metals having a high heat content. On meeting a surface, a particular particle is flattened out into a saucer-shaped disk with ragged edges. Metal-sprayed coatings, therefore, are built up of a countless number of these saucer-shaped particles, and they consequently test stronger in one direction than at right angles to it.

There is no alloying at the junc-

tion, as the nozzle temperature of the sprayed metal is far below an alloying level. Therefore, the bond is purely mechanical in nature and consists of a simple interlocking of each sprayed particle and the base metal. As the metal bond is not one of cohesion or alloying, it is only logical to so roughen a surface that it presents a maximum amount of area to which the sprayed metal can adhere, as well as to furnish small crevices or "key-fasts" by which the sprayed particles can lock themselves firmly to a surface. In addition, the surface must be dry as well as chemically clean.

The small particles pile one upon another in a haphazard manner, and give a porous structure which is comparable to sand in a bucket. The metallurgical aspects of sprayed coatings have been described in *THE IRON AGE*, Aug. 30, 1934, and descriptions of various metallizing operations were reviewed in the June 28, 1934, and Jan. 10, 1935, issues.

In review, however, it is interesting to point out that during

the spraying of molten particles a temperature necessary for fusion is seemingly belied by the fact that metal can be sprayed onto fine silk or tissue paper without injury, guncotton can be coated without exploding, and the palm of the hand can be held 6 to 7 in. from the pistol nozzle without discomfort. However, in the case of the soft metals, it is possible that each sprayed particle moves within a globule of heated air, and at the moment of impact the temperature is near the fusion point.

Coating Is Porous

Even though the particles may fuse, a sprayed coating is considerably more porous than hot dip or electro-plated surfaces. Porosity is extremely undesirable and may be overcome by mechanical, thermal, or chemical means. After spraying, the metal particles may be consolidated by hammering, wire brushing, or blasting with ball shot. Heating in a container or under a flame to give incipient fusion often suits other cases. Also, in some cases, the interstices can be filled by precipitating into them certain soluble chemical compounds.

Treatment with rotating wire brushes will result in a finer texture and decrease the porosity. A great danger in brushing metal coatings is the application of excessive pressure. If the coating is hammered, brushed, or ground too severely, the metal crumbles and separates from the base.

After the coating has been condensed by some kind of pressure treatment, the density is still less than that of the same material in the cast or rolled form. On the other hand, the hardness of the sprayed metal often exceeds that of the solid metals. The sprayed metal is also slightly more brittle although it can be turned, filed, and milled, but it is liable to flake in one direction.

The average sprayed coating, due to its porosity, must be thicker than a hot-dip coating of the same metal to be equally resistant to corrosion. In order to be wholly satisfactory, a sprayed film must be non-porous. Two coats of lead or tin are theoretically sufficient, but for stainless steel eight coats are required and for monel metal twelve coats are necessary. The average thickness of a single coating varies from 0.001 to 0.003 in.,

depending on the melting point of the metal used. Lead and tin, for example, cover a great deal thicker than the harder metals, such as monel and stainless steel. To have complete freedom from pores, a coating at least 0.0025 in. thick is necessary for lead, whereas for metals of higher melting point a coating of at least 0.010 in. is necessary.

The usual procedure for heat treatment is to subject the coating to a neutral gas or use open flames and some form of protective coating for the metal. The result is to melt or soften the sprayed surface, but care must be taken not to oxidize it. The single particles are, therefore, no longer just sticking together, but the entire surface becomes a homogeneous mass.

The thermal process finds its greatest use in aluminum coatings. The entire process consists of spraying a heavy aluminum coating and then aluminizing the surface by heating at 1290 deg. to 1830 deg. F. Oxidation is prevented by covering the surface with a brine solution, bitumen or some other special flux. The resultant Fe-Al alloy surface is non-scaling up to 1742 deg. F., and has a long life at 1830 deg. F. This method is now finding considerable application as a means of protecting other metals against high-temperature oxidation.

An average speed of spraying will deposit approximately 0.003 in. of the soft metals, such as lead, tin, and cadmium; 0.002 in. of zinc; and 0.0015 in. of copper, bronze and other metals having melting points between 1000 deg. and 2000 deg. F. The high melting point metals, such as monel, stainless steel, etc., will deposit at the rate of 0.001 in. to 0.00125 in. per coat. On flat work, an average operator can cover an area of about 120 sq. ft. per hr. with the soft metals, and an experienced operator can do even better.

Surface Preparation Important

About 80 per cent of the success of any metal-sprayed coating depends on the surface preparation,

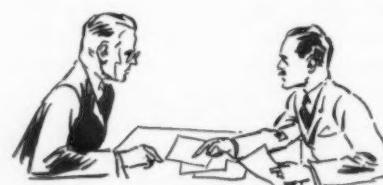
regardless of whether the surface is flat or cylindrical. The most common method of preparing a surface to receive a metal-sprayed coating is by blasting with steel grit or sand. This method is satisfactory for coating large surfaces, for coating surfaces for resistance to corrosion, and for coating surfaces which are not subjected to stress and abrasion. Machine element work parts are, however, as a rule, required to resist more varied and greater stresses.

In machine element work, most surfaces which undergo stress and are subject to wear have a cylindrical shape, such as shaftings, pistons, etc. Now and then it is necessary to coat a flat or irregularly shaped surface, but regardless of shape the surface should be prepared by machining wherever possible. The coating applied to a properly machined surface exhibits very good bonding properties, and its performance in service will be comparable with that of the original metal.

In coating work, the first thing to consider is the purpose of the coating. In the case of a shaft, it is advisable to consider whether the shaft is undersized and to what size it is to be built up. Also, whether the shaft is to resist wear or corrosion. Also to be considered are the facilities available for finishing the coated surface, that is, whether the coating can be ground or whether it must be machined.

If a coated surface is to run in a bearing, and if it must resist wear and abrasion, the surface might be coated with a high carbon steel. If the surface is to resist corrosion, it might be coated with stainless steel. It has been found that the best method for preparing a surface in order to secure the most effective bond is by cutting a thread on the surface. This thread should be cut at least 0.020 in. lower than the outside diameter of the finished surface so that the depth of the coating from the surface to the top of the thread will be sufficient to eliminate the possibility of cracking or chipping in case the surface is to be machined.

It is advisable that the coated surface be made a little longer than necessary and also that a dove-tail be undercut at each end of the undersized section. This is not

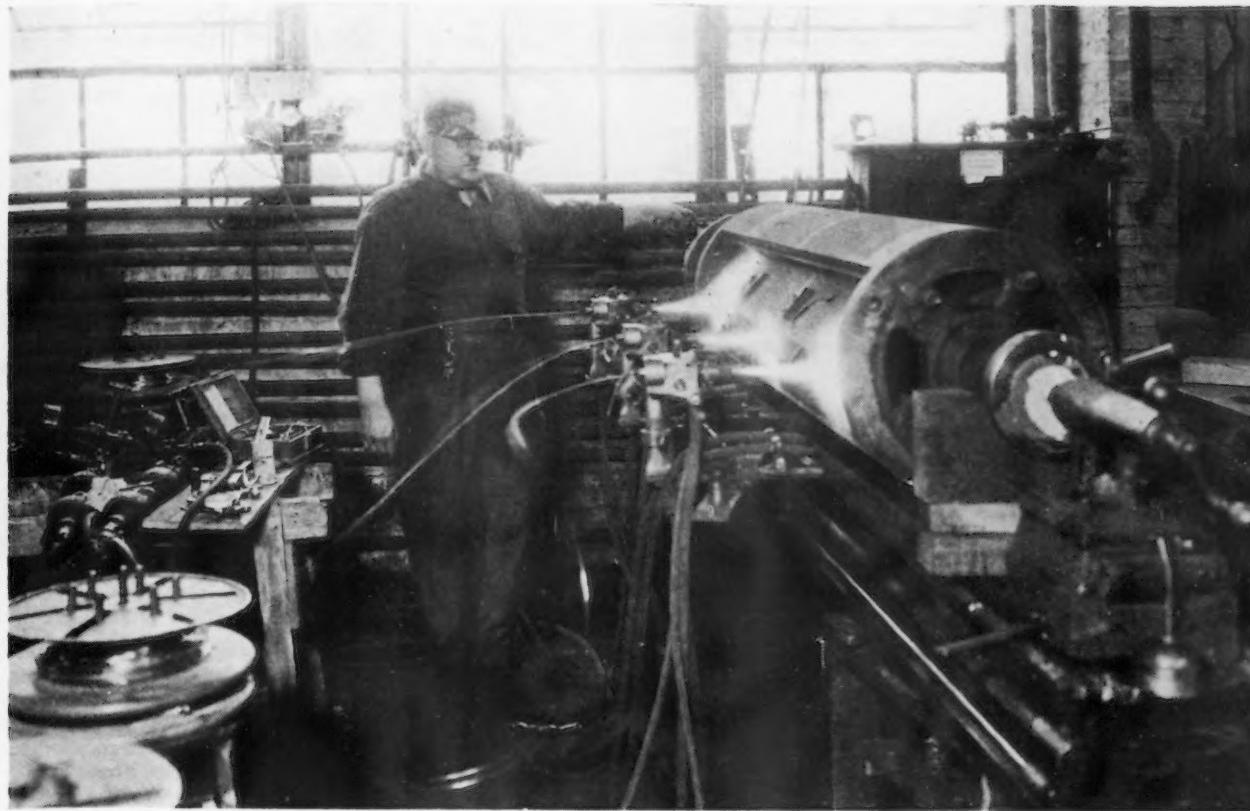




FREDERICK V. GEIER, President, Cincinnati Milling Machine & Cincinnati Grinders, Inc. Drawn by John Frew for The Iron Age.

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absolutely necessary but will eliminate the possibility of the coating splitting at the end.

The threading tool must be ground so that it will have a sharp "V" point, and the point should be practically straight up and down, i.e., with very little rake or clearance.

The tool should be rigidly mounted and held up to the work, and should be set so that the top of the tool is below the axis of the shaft being threaded. The purpose of this is to scrape or tear a thread along the surface of the work rather than to cut one. The number of threads to the inch will vary with the diameter of the shaft being prepared, the number of threads per inch decreasing as the diameter of the shaft increases. The minimum number of threads is 16 to an inch for large diameters and increases to 24 to an inch for small diameters. It is unnecessary to go to more than 24 threads, and there is no advantage in going below 16 on large pieces.

It is essential that the thread be

METAL spraying is finding an increasing use for building up worn or undersized machine elements. Unlike protective or decorative coatings, sprayed metal on shaftings, pistons, etc., must withstand a variety of stresses, must hold up under constant wear and must be exceptionally well bonded to the base metal. Modern spray guns and advanced technique such as described in this article will produce coatings fulfilling all these requirements. This picture shows three spray guns in simultaneous operation depositing $3\frac{1}{64}$ in. of high-carbon steel on a printing press cylinder 16 in. in diameter and 56 in. long.

will be found clinging to the top of the threads. These should be removed with a tool which is ground square on the end. This tool should be run in until it just misses the top of the threads. This operation will remove the particles clinging to the top of the thread, and the piece will be ready to receive the coating.

There are certain conditions under which this manner of preparation is not advisable. It is an established fact that the presence of a sharp corner in a shaft undergoing flexion or torsion and rapid stress reversals will introduce a stress concentration factor at that point. This "factor of uncertainty" is usually taken as four. This means that a shaft containing a sharp corner can safely bear only one-fourth the load that a smooth or filleted shaft of the same diameter can bear. It is evident then that in the case of crankshafts and similar equipment, the possibility of failure by fatigue is increased fourfold by cutting a sharp thread on the bearing sur-

(CONTINUED ON PAGE 132)

torn and rough. The thread that has barbs on the side will disclose minute fissures on the flank of the thread and will present a maximum surface to be metallized, and will, therefore, give the best bond. The tool should be fed into the shaft to a full-thread depth, and the threading operation completed in one traverse of the threading tool.

After the piece is threaded, it will be found that small pieces have been torn from the sides of the thread. Some of these particles



THIS WEEK ON THE ASSEMBLY LINE



... Automobile production continues to rise with top not yet in sight.

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... Spring selling campaigns stress bright colors.

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... Railroads hasten to equip freight cars with loading devices as shortage faces industry.

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... General Motors president fears effects of Motor Carrier Act which is now in effect.

DETROIT, April 7.—For the sixth week, a gain in automotive production has been recorded and judged by the general feeling in the industry today, it is apparent that the rate of production will continue to be accelerated during the coming month. Some optimists are quite willing to believe that sales will continue at a high rate right through the summer and that there will be very little let-down between model changes.

Cram's estimate of production for the week ended April 4 is 108,426 units, as against 98,145 for the week before. This represents an increase of about 73 per cent over the low point in February. Projected schedules for the month call for over 500,000 units and second quarter business should compare very favorably with the second quarter of 1935.

March sales have been extremely encouraging. Studebaker reports the largest sales in seven years and 60 per cent ahead of the volume of last year. Buick produced almost twice as many cars as in March

1935, touching 14,829 units, and the April schedule calls for 16,654 units, an increase of 2000 over the original figure. March sales and shipments for Packard exceeded all previous March records and the April schedule of 8000 units is the highest of any month in the history of the company. The 120 line is now working at full capacity, turning out 342 units a day. Nash reports March shipments greater than any similar month since 1930. Ford, Chevrolet and Plymouth showed sharp increases in production last week. Chrysler April schedules will top 100,000 units.

What is surprising about March figures is the fact that the real spring selling season is just now starting. Dodge last Saturday had an open house spring motor pageant, in which the emphasis was placed on models in bright new season's colorings. Hudson is also putting on a campaign in keeping with the season. Such campaigns as these are planned months ahead and it was pretty hard to find inspiration for spring drives in February, when Detroit's streets were

covered with ice. Hudson went out to Hollywood to shoot advertising pictures "on location" to visualize the proper spring setting. The same idea has also been applied to used cars, and one of the lacquer firms has been urging dealers to refinish used cars in bright sparkling colors that correspond to the new cars.

Steel Mills Pressed for Deliveries

With accelerated schedules in the automobile plants, steel sellers are being pressed hard for delivery. Whereas it was expected that there would be a slight let-up in buying after the rush to get in under the wire on the old price set-up, actually there has been a great deal of continued buying activity, simply in order to meet production demands. Although the dead-line on delivery of steel under the old prices was set tentatively at April 15 it now appears that this date will be extended in a few instances largely because the mills are not able to turn out the material fast enough. Although none of the automobile manufacturers are committing themselves beyond May production, there is a feeling that the demand for steel will be sustained well into the summer.

Freight Car Shortage

The only aftermath of flood conditions in the East seems to be that there is now a rather acute shortage of freight cars with which to deliver automobiles to Eastern markets. Floods and their subsequent damage have delayed empties from getting back to Detroit. Another factor in the situation is that there are not enough cars equipped with auto loading devices. The New York Central has about 4000 cars equipped with automobile loaders, but could keep about 7000



such cars active in peak months such as are now approaching. The Pennsylvania Railroad is seeing the handwriting on the wall and is currently having 500 cars built equipped with car loaders, accommodating four automobiles per freight car. This is part of the 10,000-car order issued by this road in December. All available high-wide equipment having large doors is so equipped at the present time. The Wheeling & Lake Erie Railroad is also constructing 50 new automobile cars at its Toledo shops. Strangely enough, some roads, such as the Wabash and the Chicago & North Western have a surplus of automobile cars, although not equipped with loaders.

Statistically, the position of the railroads with regard to automobile haulage is something like this, based on accurate estimates from reliable sources: In 1927, the railroads had 75 per cent of the available business; in 1928, they peaked at 750,000 cars; in 1935, this number had dropped to 400,000 and 44 per cent of the available business. Of the remainder of completed-automobile shipments, 48 per cent last year went to highways by way of haul-aways and drive-aways, and the rest went to boats during the navigation season. To give an idea of the volume of this traffic, it is understood that Chrysler is currently using 750 freight cars daily and will require a thousand or more per day by the end of the month. The salvation of the railroads will be in equipping automobile cars with loading devices. Incidentally, the most serious factor limiting the number of cars that leave the factories by highway is the heavy taxes imposed by states on cars that are driven and towed in caravans, such as is the

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By FRANK J. OLIVER
Detroit Editor, The Iron Age

present practice. Some states charge as high a fee as \$5 per car for such highway use.

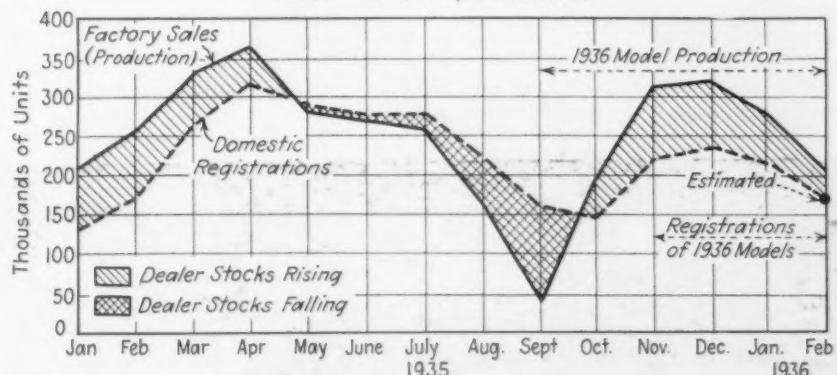
Speaking of highways, the Motor Carrier Act regulating interstate bus and truck operation went into effect last week. Whereas the present regulations cover only commercial operations, some fear has been expressed that regulations ultimately might be extended to private transportation. Leaders of the industry have discounted the imminence of such efforts on the part of the Federal Government, although there is a provision in the Act for such regulation "if need therefor is found." Months of inquiry would be necessary to prove such a need, hence it is felt that the chance of Federal interference, beyond the duties already established in respect to busses and trucks, is remote.

In his annual report to the stock-

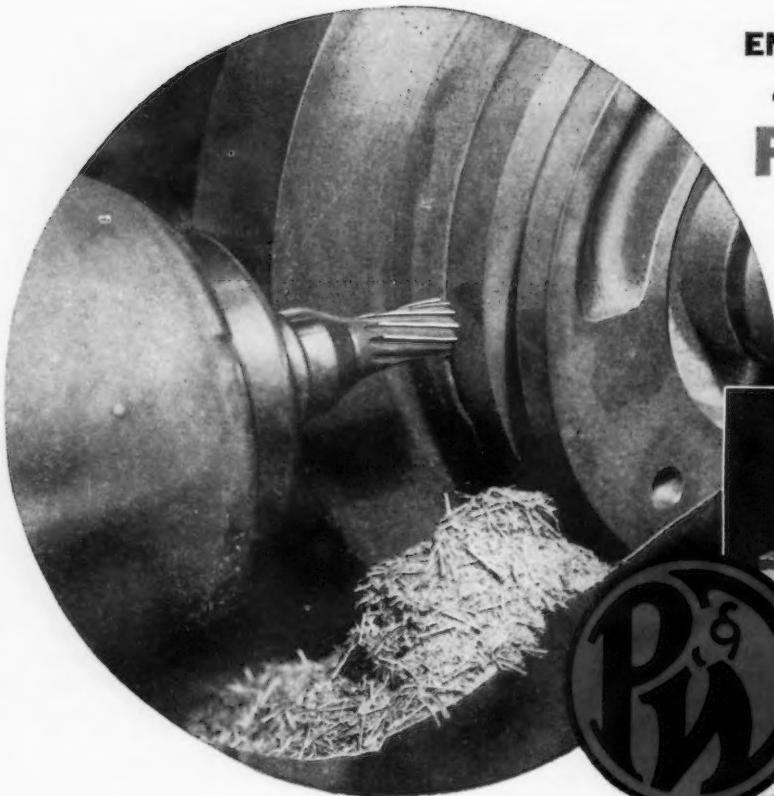
holders of General Motors Corp., Alfred P. Sloan, Jr., expresses the fear that the Motor Carrier Act will tend to throttle the efficiency and limit the effectiveness of now existing standards of highway transportation, instead of giving the national economy the benefits of this new, flexible and more economic form of transportation. "Instead of the deadening hand of strait-jacket governmental regulation," he asks, "would it not be wiser to establish each agency on its own foundation of fact and effectiveness and permit each to develop its maximum contribution to the national welfare?"

What Mr. Sloan fears is the sort of thing that is under discussion now in the form of the proposed Wheeler-Crosser bill, providing dismissal compensation for railroad employees displaced as a result of reduction in service or facilities of an individual railroad, or the coordination of facilities of two or more railroads. According to one railroad executive, such a bill substitutes bureaucracy where managerial discretion should control. It is an unreasonable and arbitrary

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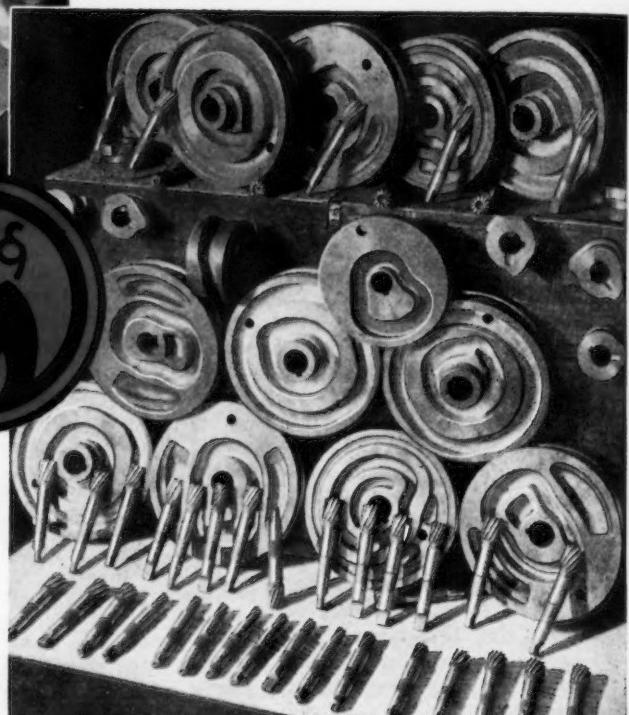


END MILL No. 1 35 pcs.

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P&W END MILL . . 135 pcs.

These are the pieces grouped with the
P&W End Mills ($\frac{1}{2}'' - \frac{5}{8}'' - \frac{3}{4}''$) which
have proved so satisfactory.



THESE parts are sewing machine cams, and the operation is milling the raceways for the motions which operate the various movements of the machine. The work is done by the Landis Machine Co. in St. Louis, Mo.

This job is not easy. The end mill must cut on both sides, and to depths as great as $\frac{7}{8}''$. The finish must be almost as good as a ground finish, besides being straight. The raceways must be accurate within .0005".

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invasion of the property rights of the railroad owner. Certainly, if such legislation should ever affect operation of motor vehicles, it is not stretching a point to imagine that ultimately the tendency would be to regulate manufacture of motor vehicles. If it did, we would not see such handsome annual reports as General Motors issued a few days ago.

General Motors Record

Public utilities, which are held to a limited earnings basis on capital investment, must look enviously on net earnings of \$167,226,510 on an investment in real estate, plant and equipment amounting to \$592,150,-300, or 28.3 per cent. (Class I railroads earned less than 2 per cent on their property investment in 1935.) General Motors has lost money in only one year, 1921, just cleared expenses in 1932, but ran up profits to \$83,213,676 in 1933, which was hardly a good year for the industry as a whole. Since the formation of the corporation in 1909, altogether \$585,079,131 of profit has been ploughed back into the enterprise.

This money has gone to reorganization, readjustment and expansion of corporation's manufacturing facilities. The program is being developed around a further decentralization of primary manufacturing units. The corporation believes that the soundest policy, both economically and socially, is to distribute the productivity of industry among as many different communities as is practically possible, provided that the fundamental objective of lowest possible cost is not penalized thereby. Such a policy insures that as industry expands the expansion can be carried on more soundly because of the fact that it is spread among a greater number of communities. And when the time comes for a retraction in business, the burden can be carried better because of the greater number of communities among which

it is divided. This policy obviously represents a diametrically opposed viewpoint from that of the Ford Motor Co., which favors the other extreme in centralization and complete integration of industry in one locality.

"The remuneration of the corporation's administrative staff is a personal relationship between each individual involved and the corporation itself." So read the 1934 Annual Report and it was repeated in the 1935 report. How true this was brought out only too clearly in recently published "compensations" of General Motors executives in 1934 which were released by the Securities and Exchange Commission.

The report reveals that no executive received a salary over \$120,000 a year, yet the total compensation for some of these top executives ran much larger than that, owing to the bonus plan used by General Motors. Bonuses are awarded in the form of stock to top operating officials. Altogether, 71,664 shares were so distributed in 1934, 189,010 in 1935. William P. Knudsen's total compensation in 1934 was \$211,128. Alfred P. Sloan's compensation was a close second at \$201,743 and Charles F. Kettering received \$140,495.

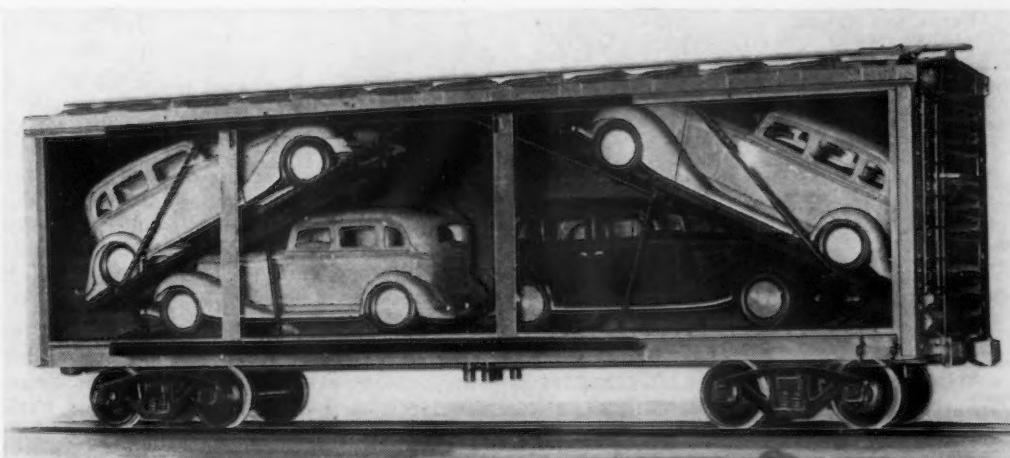
K. T. Keller and F. M. Zeder, who hold positions in Chrysler corresponding to those of Mr. Knudsen and Mr. Kettering, each were compensated to the extent of \$68,989 in the same year. In general, Chrysler salaries ran much lower. David Wallace, vice-president in charge of manufacturing at the Jefferson Avenue plant, drew \$22,982 and W. J. O'Neil, who holds a similar position at Dodge, \$22,179, and P. C. Sauerbrey, vice-president of Plymouth, drew \$18,437.

Total General Motors payrolls rose from \$263,204,225 to \$323,030,599, an increase of 22.7 per cent. This does not include the Christmas present that was distributed to em-

ployees, amounting to almost \$5,000,000. Stockholders received \$105,654,968 in dividends. There was an increase in the average hourly wage rate of approximately 5 per cent, and the current average hourly rate is the highest in the history of the corporation, being 5 per cent above the 1929 figures. Compared with the previous year, there was an increase in the average working hours per week of 11 per cent. As a result, the annual earnings of those workers who are continuously employed were improved substantially, as compared with the previous year. Nevertheless, as a further step toward smoothing out fluctuation in employment, the corporation set aside a fund of \$60,000,000 to build up parts stock during periods when production is ordinarily low. The average number of persons employed by the corporation in 1935 was 211,712, compared with 191,157 in 1934.

Based on total United States registrations, General Motors lost ground in 1935, as compared with 1934, securing 37.5 per cent of the total volume as compared with 39.7 the year before. Chrysler held its own at 22.9 per cent, or 629,243 units. General Motors' position was adversely affected by delays in production at the beginning of the year, principally on knee action assemblies for Chevrolet and turret tops, as well as by labor difficulties at the Toledo transmission plant of Chevrolet. Dealers couldn't get even demonstrators in early January. Nevertheless a considerable gain was registered in total production. General Motors sales to dealers in the United States were 1,370,934 cars and trucks, as compared with 959,494 in 1934, a gain of 42.9 per cent. Retail sales by dealers to consumers in the United States were 1,278,996 units, as compared with 927,493 units in 1934. World production figures were 1,715,688 units and 1,240,447 respectively.

ONLY by the installation of such car loading devices as the one made by the Evans Products Co., Detroit, can the railroads hope to recapture automobile business lost to haulaways and driveways. At least 500 of the 10,000 new freight cars ordered by the Pennsylvania Railroad will be so equipped.



March Pig Iron Output

Up 4.7 Per Cent

PRODUCTION of coke pig iron during March amounted to 2,040,311 gross tons, compared with 1,823,706 in the preceding month. The daily rate last month showed a rise of 4.7 per cent over that of February, or from 62,886 to 65,816 tons. Production for the first quarter this year was 5,889,902 gross tons, compared with 4,855,916 tons in the corresponding period last year.

There was a gain of six stacks making iron on April 1, the 126 furnaces operating at a rate of 68,395 tons daily, against 120 one month before which were producing iron at a rate of 64,550 tons daily. Eight furnaces were blown in during the month and two were blown out or banked. The Steel corporation blew in three furnaces, and independent steel companies put five in operation and took one steel making and one merchant unit off blast.

The furnaces blown in were one Carrie, one Duquesne and one South Chicago (new) of the Carnegie-Illinois Steel Corp.; one Donner, one Haselton and one River furnace of the Republic Steel Corp.; one Sparrows Point unit of Bethlehem Steel Co., and the Swede furnace of the Alan Wood Steel Co.

Blown out or banked were one Cambria furnace of the Bethlehem Steel Co., and one Hubbard unit of the Youngstown Sheet & Tube Co.

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons)		April 1		March 1	
	March (31 Days)	February (29 Days)	Number in Blast	Operating Rate, Tons a Day	Number in Blast	Operating Rate, Tons a Day
New York:						
Buffalo	137,605	104,785	8	4,440	7	3,615
Other New York and Mass.	6,565	6,156	1	210	1	210
Pennsylvania:						
Lehigh Valley	34,532	33,724	3	1,115	3	1,165
Schuylkill Valley	17,991	13,843	2	625	1	335
Susquehanna and Lebanon Valleys	10,829	11,629	1	350	1	400
Ferromanganese	...	...	0	...	0	...
Pittsburgh District	367,785	354,130	22	12,825	20	12,450
Ferro. and Spiegel	9,980	11,141	3	320	3	385
Shenango Valley	20,052	18,511	1	645	1	640
Western Pennsylvania	47,387	51,143	3	1,250	4	1,765
Ferro. and Spiegel	4,901	5,860	1	160	1	200
Maryland	91,511	69,246	4	3,420	3	2,390
Wheeling District	83,339	98,746	6	2,690	*6	*3,405
Ohio:						
Mahoning Valley	229,119	193,406	11	7,595	11	7,155
Central and Northern	203,927	166,879	13	7,030	12	6,040
Southern	47,414	537,392	4	1,530	4	1,290
Illinois and Indiana	434,783	378,423	21	14,645	20	13,670
Michigan and Minnesota	81,848	77,327	5	2,640	5	2,665
Colorado, Missouri and Utah	36,515	24,505	3	1,180	3	1,015
The South:						
Virginia	...	...	0	...	0	...
Ferro. and Spiegel	2,536	2,770	1	80	1	95
Kentucky	9,592	12,892	1	415	1	445
Alabama	156,792	145,981	11	5,060	11	5,035
Ferromanganese	5,308	5,217	1	170	1	180
Tennessee	...	...	0	...	0	...
Total	2,040,311	*1,823,706	126	68,395	120	*64,550

†Revised. *Riverside No. 2 was banked in February.

Daily Average Production of Coke Pig Iron

	1936	1935	1934	1933	1932
January	65,351	47,656	39,201	18,348	31,380
February	62,886	57,448	45,131	19,798	33,251
March	65,816	57,098	52,243	17,484	31,201
April	...	55,449	57,561	20,787	28,430
May	...	55,713	65,900	28,621	25,276
June	...	51,750	64,338	42,166	20,935
1/2 year	...	54,138	54,134	24,536	28,412
July	...	49,041	39,510	57,821	18,461
August	...	56,816	34,012	59,142	17,115
September	...	59,216	29,935	50,742	19,753
October	...	63,820	30,679	43,754	20,800
November	...	68,864	31,898	36,174	21,042
December	...	67,950	33,149	38,131	17,615
Year	...	57,556	43,592	26,199	23,733

Production of Coke Pig Iron and Ferromanganese

	Gross Tons Pig Iron*		Ferromanganese†	
	1936	1935	1936	1935
January	2,025,885	1,477,336	24,766	10,048
February	1,823,706	1,608,552	24,988	12,288
March	2,040,311	1,770,028	22,725	17,762
April	...	1,663,475	...	18,302
May	...	1,727,095	...	17,541
June	...	1,552,514	...	12,961
1/2 year	...	9,799,000	...	88,902
July	...	1,520,263	...	13,175
August	...	1,761,286	...	12,735
September	...	1,776,476	...	15,983
October	...	1,978,411	...	19,007
November	...	2,065,913	...	18,245
December	...	2,106,453	...	17,126
Year	...	21,007,802	...	185,173

*These totals do not include charcoal pig iron. The 1934 production of this iron was 25,834 gross tons.

†Included in pig iron figures.

Merchant Iron Made, Daily Rate

	Tons
January	1936
February	1935
March	1936
April	1935
May	1936
June	1935
July	1936
August	1935
September	1936
October	1935
November	1936
December	1935

Youngstown Plans To Refund Bonds

YOUNGSTOWN SHEET & TUBE CO. has filed with the Securities and Exchange Commission in Washington a registration statement covering \$90,000,000 of new securities as a preliminary step in the proposed refunding of its \$84,962,000 outstanding first mortgage 5 per cent bonds. The new securities proposed are \$60,000,000 of first mortgage bonds maturing in 25 years and \$30,000,000 of convertible debentures maturing in 15 years. Interest rate and redemption provisions have not yet been determined on either issue, nor have the conversion terms for the debentures.

Bankers Trust Co., New York, is trustee under the first mortgage and the Guaranty Trust Co., New York, is named as trustee in the proposed indenture under which the debentures are to be issued.

Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available.

	February, 1936	January, 1936	February, 1935	Two Months 1935	Two Months 1936
Raw Materials:					
Lake ore consumption (gross tons)*.....	2,632,306	2,951,568	2,467,269	4,747,662	5,583,874
Coke production (net tons)*.....	3,293,542	3,450,342	2,873,432	5,762,984	6,743,884
Pig Iron:					
Pig iron output—monthly (gross tons)*.....	1,827,972	2,025,885	1,608,552	3,085,888	3,853,857
Pig iron output—daily (gross tons)*.....	63,034	65,351	57,448	52,303	64,231
Castings:					
Malleable castings—production (net tons)*.....	40,449	48,414	41,377	84,777	88,863
Malleable castings—orders (net tons)*.....	38,110	44,116	41,225	85,793	82,226
Steel castings—production (net tons)*.....	.....	44,298	29,687	58,722	.....
Steel castings—orders (net tons)*.....	.....	59,019	31,725	64,074	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)*.....	2,967,803	3,049,439	2,777,765	5,649,296	6,017,242
Steel ingot production—daily (gross tons)*.....	118,712	112,942	115,740	110,771	115,716
Steel ingot production—per cent of capacity*.....	54.09	*51.46	52.28	50.04	52.7
Finished Steel:					
Trackwork shipments (net tons)*.....	4,116	3,366	2,892	5,225	7,482
Steel rail orders (gross tons)*.....	147,450	214,541	80,174	131,174	361,991
Sheet steel sales (net tons)*.....	138,244	174,805	183,322	505,153	313,049
Sheet steel production (net tons)*.....	191,359	223,000	219,062	454,776	414,359
Fabricated shape orders (net tons)*.....	114,545	*116,441	75,841	140,147	230,986
Fabricated shape shipments (net tons)*.....	69,855	*78,438	68,527	158,154	148,293
Fabricated plate orders (net tons)*.....	27,830	38,709	15,064	33,842	66,539
Reinforcing bar awards (net tons)*.....	23,830	67,810	22,265	40,015	91,640
U. S. Steel Corp. shipments (tons)*.....	676,315	721,414	583,137	1,117,192	1,397,729
Ohio River steel shipments (net tons)*.....	13,782	65,760	64,369	117,025	79,542
Fabricated Products:					
Automobile production, U. S. and Canada*.....	304,232	380,554	353,781	657,173	684,786
Construction contracts, 37 Eastern States*.....	\$142,050,200	\$204,792,800	\$75,047,100	\$174,821,000	\$346,843,000
Steel barrel shipments (number)*.....	508,974	535,370	402,928	841,262	1,044,344
Steel furniture shipments (dollars)*.....	\$1,484,145	\$1,586,446	\$1,064,219	\$2,203,716	\$3,070,591
Steel boiler orders (sq. ft.)*.....	810,387	*623,364	283,726	675,510	1,433,751
Locomotive orders (number)*.....	46	14	1	1	60
Freight car orders (number)*.....	7,236	1,050	806	830	8,280
Machine tool index*.....	112.1	110.8	53.0	61.5	.....
Foundry equipment index*.....	110.4	127.0	75.7	†76.4	†118.5
Foreign Trade:					
Total iron and steel imports (gross tons)*.....	43,358	50,489	28,905	51,689	93,847
Imports of pig iron (gross tons)*.....	14,660	15,033	10,741	12,774	29,693
Imports of all rolled steel (gross tons)*.....	18,208	22,958	12,443	27,497	41,166
Total iron and steel exports (gross tons)*.....	213,736	241,564	228,537	491,277	455,300
Exports of all rolled steel (gross tons)*.....	65,947	79,100	67,329	140,725	145,047
Exports of finished steel (gross tons)*.....	62,322	74,254	59,147	125,670	136,576
Exports of scrap (gross tons)*.....	142,165	153,906	151,720	331,350	296,071
British Production:					
British pig iron production (gross tons)*.....	584,700	595,500	483,100	1,004,300	1,180,600
British steel ingot production (gross tons)*.....	938,500	912,500	769,500	1,527,300	1,851,000
Non-Ferrous Metals:					
Lead production (net tons)*.....	34,127	36,296	27,495	56,809	70,423
Lead shipments (net tons)*.....	33,086	34,590	32,523	66,218	67,676
Zinc production (net tons)*.....	36,228	*41,917	33,468	68,603	78,145
Zinc shipments (net tons)*.....	39,918	46,468	34,877	70,332	86,386
Deliveries of tin (gross tons)*.....	5,600	6,635	3,905	8,505	12,235

*Three months' average. *Revised.

Source of figures: ^a Lake Superior Iron Ore Association; ^b Bureau of Mines; ^c THE IRON AGE; ^d Bureau of the Census; ^e American Iron and Steel Institute; ^f National Association of Flat-Rolled Steel Manufacturers; ^g American Institute of Steel Construction; ^h United States Steel Corp.; ⁱ United States Engineer, Pittsburgh; ^j When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of the Census; ^k F. W. Dodge Corp.; ^m Railway Age; ⁿ National Machine Tool Builders Association; ^o Foundry Equipment Manufacturers Association; ^p Department of Commerce; ^q British Iron and Steel Federation; ^r American Bureau of Metal Statistics; ^s American Zinc Institute, Inc.; ^t New York Commodities Exchange.



... **Senate Interstate Commerce Committee Loses Its Taste for Anti-Basing Point Legislation.**

• • •

... **Wheeler-Utterback Bill Not Likely Even to Be Reported Out of Committee.**

• • •

... **Steel Companies Face Labor Board as "Breathing Spell" for Business is Reduced to Occasional Gasps.**

• • •

... **Major Berry Finds Reelection of President Roosevelt More Important Than His Work as Industrial Coordinator.**

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BY L. W. MOFFETT
Resident Washington Editor,
The Iron Age

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WASHINGTON, April 7.—In all the exhaustive testimony on the Wheeler-Utterback anti-basing point bill the term "Pittsburgh-minus" was missing. . . . Of Pittsburgh-plus, Chicago-plus, Coatesville-plus there was abundant mention-plus. . . . And by indirection the record abounds with references to the minus sign. . . . For much was said about freight absorption which means a base price less a certain amount of freight which a producer has to pay in order to get the business. . . .

According to Donald R. Richberg, NRA studies developed the fact that for the consuming public as a whole more freight is absorbed than is charged by the steel industry. . . . That means therefore that realized net prices as a whole are less than the actually quoted base prices and when not shaded, the published base prices are correct as to the specific areas where they prevail. . . . but with volume a basic requirement for profits in the steel industry, a producer must seek markets outside his own territory and if he is going to compete in "foreign" markets he must necessarily absorb some freight. . . . His net realization consequently is less than the base price in his own area. . . .

For want of a better term, this practice was commonly called Pittsburgh-minus. . . . The term was symbolic, for it reflected the growth of the steel industry and

the force of the law of supply and demand, which somehow or other still operates despite its temporary suspension by the politico-economic quacks. . . . Building up of capacities in other sections had resulted in breaking down the single Pittsburgh-plus system. . . . It represented newly constituted supply, which developed and will develop not only additional basing points but additional products at present and future basing points. . . .

It was not stated in this way by them but in substance this was the view expressed by different steel executives before the Senate Committee on Interstate Commerce. . . . Eugene G. Grace, president, Bethlehem Steel Corp., for example, said he assumed Buffalo would be made a basing point for plates as Bethlehem's production of this line at Lackawanna grows. . . . The importance and the volume of production were named by him as the key to what makes a basing point. . . . And if, just as in any other industry and in agriculture, these relationships are out of kilter here or there they will inevitably be forced into alignment. . . . And until they do this will not happen regardless of political or other attacks, childish harping on laissez faire, on "rugged individualism," and on the so-called antiquated methods of the steel industry of price fixing and maintenance. . . .

Witness after witness submitted to the committee comparative price schedules covering a range of years which showed strikingly how steel prices have been decreased and the quality of the product vastly improved. . . . The point was set forth clearly by William A. Irvin, president, United States Steel Corp., among others. . . . Without in any way expanding the subject he also showed the strides made by the industry in research, its development of new products, and its keeping alert to modern-day demands of its multiplicity of consumers from watchmakers to the automobile

'ROLLS' ahead in PRODUCTION

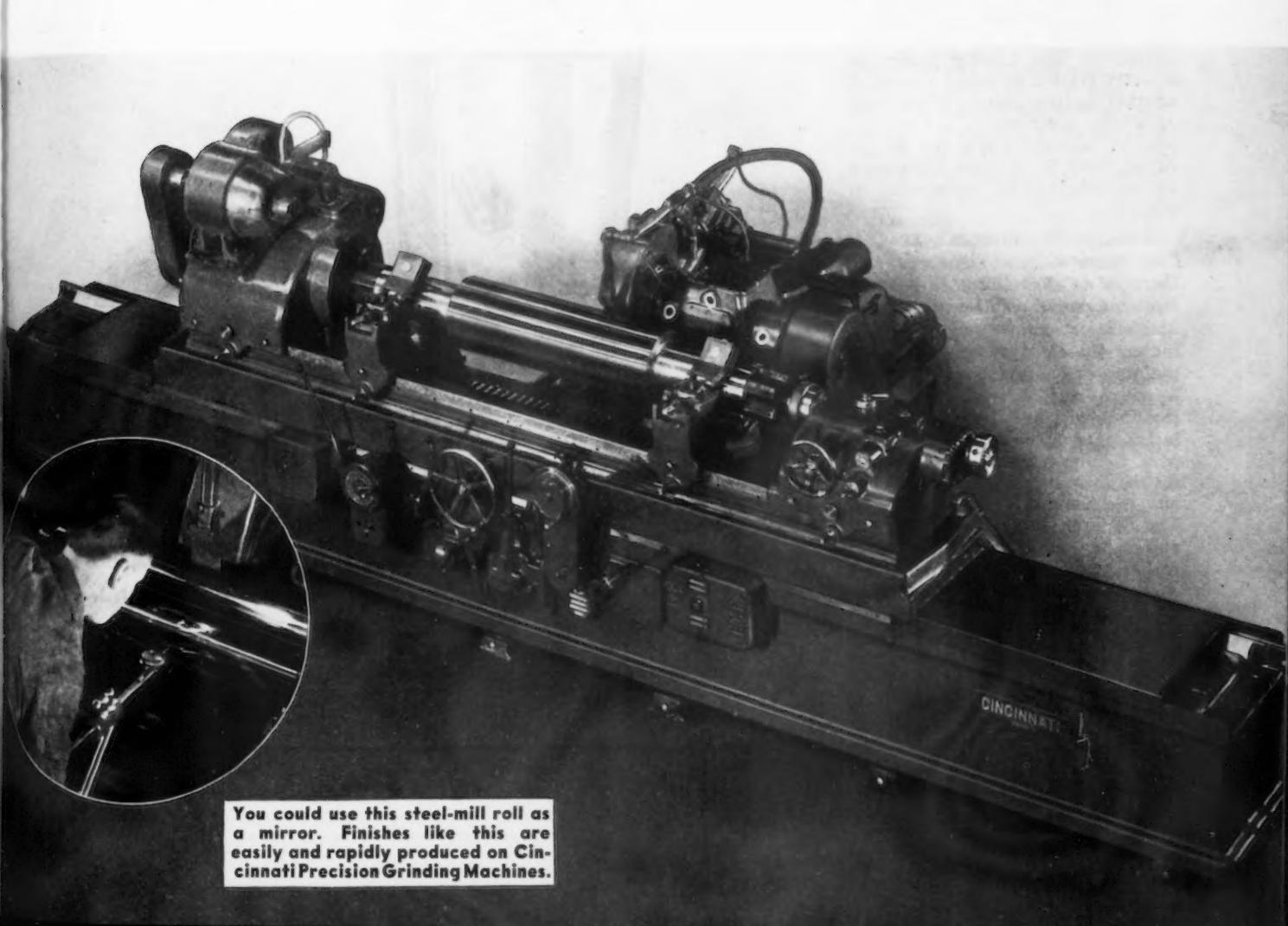
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manufacturers and railroad owners. . . . Unless the industry does so, it will find that in some way another industry has grabbed much of its markets. . . . Substitutes cannot wholly replace but they can make heavy inroads. . . . If one company doesn't keep abreast of technological developments, then out it goes. . . . These things are taking place, blinded, pontifical or ignorant critics of the industry, to the contrary, while wages are at an all-high peak and hours held to eight a day, or less, with a necessary and mild flexibility, just as the situation should be. . . .

Assuming an f.o.b. mill system of quoting prices, it is readily agreed by even the most bitter critics of the present expanding multiple-basing point system that this certainly would not mean uniform mill prices. . . . There would still exist, again by reason of the law of supply and demand and geographical location, differentials between the various producing points, though a sudden change to such a system would bring about dislocation of both the producing and consuming industries. . . . This is conceded by some of those who criticize the present system. . . .

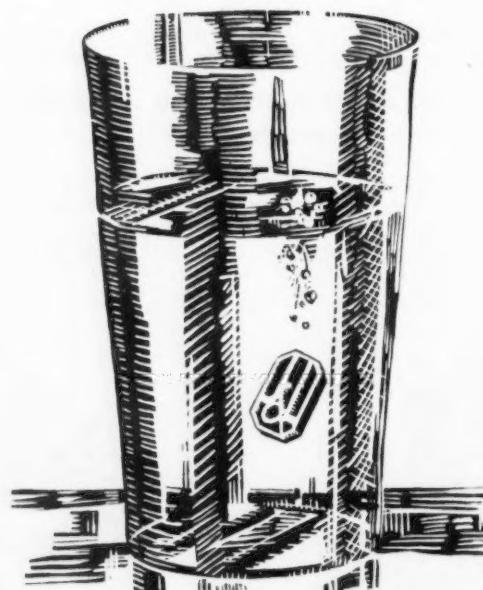
Simply because A is a basing point and B is not is no reason why A does not have to take B into account and quote a price sufficiently low to keep B from getting into A's area to a point where A's business is so restricted as to make it unprofitable. . . . And it goes without saying that prices quoted at one basing point are directly related to prices quoted at another basing point on the basis of a like premise. . . . The competitive element could not be escaped, even if it were attempted, by so-called price agreement or otherwise. . . .

Steel, in Washington's eyes, is "big business." . . . In its lexicon there is no such thing as a small steel company. . . . Hence the popular clamor against steel in Washington these days and the complaints, the investigations, the hearings, and, it might be added, the "inquisitions." . . . Though the latter, it may be said in all fairness, fortunately do not characterize the attitude of Senator Wheeler and the committee he heads. . . . The Senator, like some other Senators, has at times borne down rather heavily on some of the steel witnesses and drawn conclusions which are not well founded, but taken in all, his attitude has not been one of persecution. . . . At moments that did appear to be the tone of some of the Senatorial critics, but a more reasonable attitude and an apparent desire to open their

minds to steel witness evidence developed among the committee members as the hearings proceeded. . . . The Senators who have been most critical of the basing point system may still be in favor of the Wheeler-Utterback bill but they assuredly have reflected a broader and more sympathetic understanding of the basing point system than they did at the outset of the hearing. . . . Incidentally, they have found that while some consumers have complained against the basing point practice they have also found that many are strongly opposed to its elimination. . . . And it may be added that a few honestly inspired protests from home, entirely free from propaganda, and lobbying, are more effective than

all the organized propaganda and lobbying that can be combined. . . . This is another way of stating the deservedly low opinion held of much propaganda and lobbying activities conducted in Washington to influence legislation. . . .

The attacks on the basing point system shoot out from different bases, a sort of multiple basing point attack, as it were, both inside and outside of Washington. . . . In Washington it is not reflected alone in the Wheeler-Utterback bill. . . . It is also reflected in the so-called Patman anti-chain store bill and it is suspected that both had a common source in the Federal Trade Commission. . . . That the Patman bill has abolition of the basing point in mind is plainly



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lighten the operator's duties, yet give him a more productive day. The profit

stated in the majority report on that measure submitted to the House last week from the Committee on Judiciary. . . . Section 5 of the bill reads as follows: "That the word 'price' * * * shall be construed to mean the amount received by the vendor after deducting actual freight or cost of other transportation, if any, allowed or defrayed by the vendor." . . . Then referring to this section, the report says: "in effect, this provision of the bill is designed to put an end to price discrimination through the medium of the basing-point or delivered-price system of selling commodities. . . . It will require the use of the f.o.b. method of sale." . . . Whether or not the section would accomplish the end proposed, the

majority says that is the purpose. . . .

▼ ▼ ▼

Steel Companies Facing Labor Complaints

Just to make sure that steel's "breathing spell" is over, the National Labor Relations Board now has three companies on the carpet in Washington for alleged violation of the Wagner-Connery Labor Disputes Act. . . . They are the Jones & Laughlin Steel Corp., the Wheeler Steel Corp., and the Crucible Steel Co. of America, with a corps of "labor experts" submitting testimony to back up complaints filed by the Amalgamated Association of Iron, Steel and Tin Workers. . . .

Meanwhile Department of Justice attorneys are reported to be studying the Supreme Court decision in the Sugar Institute case to find out if it applies to the basing point system. . . . Some disinterested attorneys, outside the Government and the steel industry, do not think it does. . . . The court's condemnation of the delivered price system in that case is construed as applying to a system of fixing arbitrary freight rates, a practice that does not apply to the basing point system used in the steel industry. . . . Senator Wheeler has said that "it is my understanding that the Supreme Court decided it was unlawful for the Sugar Institute to fix prices and freight charges through the basing-point system. . . . But we still need my bill. . . . If it is passed, it will not be necessary, as it is now, to prove concerted action in order to obtain a conviction under the anti-trust laws." . . .

Fabricator Heard on Tax Bill

Meanwhile a well-known steel fabricator joined the parade of industrial and other witnesses who are sharply assailing the political tax bill being considered by the House Committee on Ways and Means. . . . Addressing his remarks to the provision to levy high taxes on undistributed corporation income, Clyde Conley, president of the Mount Vernon Bridge Co., Mount Vernon, Ohio, appeared before the committee and said: "I plead with you to make some provision whereby we can have a chance to make up losses without penalty. . . . Without that we are sure to be driven to the wall along with all other small companies. . . . Without such provision, we will not be in a position in the future to do our part in absorbing the shock of lessening demand for our products, and we will not be in a position to take care of as much unemployment as in the emergencies of the past." . . .

Stating that the capital and working reserve of the company had been depleted seriously, Mr. Conley told the committee that over 11 years' dividends have exceeded net profits of \$259,000 by approximately \$24,000. . . . In reply to a question by Representative Vinson of Kentucky, Mr. Conley said he did not know the committee was considering a proposal for allowing dividends paid out in excess of net income in one year to be credited against net income over two succeeding years for tax purposes. . . . Mr. Conley said that had the new corporation plan been in operation, the company's taxes

REMEDY FOR MACHINISTS AND SHOP MANAGERS

possibilities and the close limits held by the Fay do away with manager's headaches. The new Saddle and Ram type Turret Lathes are another ingredient. Here you have every useful kind of a turret lathe for every kind of turret lathe work in one unified line—a line replete in productive and labor saving features.

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would have been \$11,000 higher over 11 years and surpluses would have been reduced by that amount, or 30 per cent. . . . He said that should this thing happen for the next 10 years, "I do not believe we could continue operations." . . .



Major Berry Goes Into Politics

The ways of politics are often strange and unusual. . . . But seldom, if ever, have they taken a more peculiar, not to say bold and inept, turn than that given them by Industry Coordinator George L. Berry. . . . The resourceful major, head of the Pressmen's Union, potential candidate for Governor of Tennessee, took time out last week from "coordinating" management

and labor, to announce the formation of Labor's Non-Partisan League which "has for its 1936 purpose the reelection of the Hon. Franklin D. Roosevelt to the Presidency of the United States." . . . The announcement came shortly after the President issued an executive order continuing for one year the Major's so-called Council for National Progress. . . . The normal view is that a Government representative, even though unsalaried, as the Major is, can hardly reconcile his supposed position as an unbiased medium to bring industry and labor together to enter upon the high road to recovery, with that of an active head of a political party. . . .

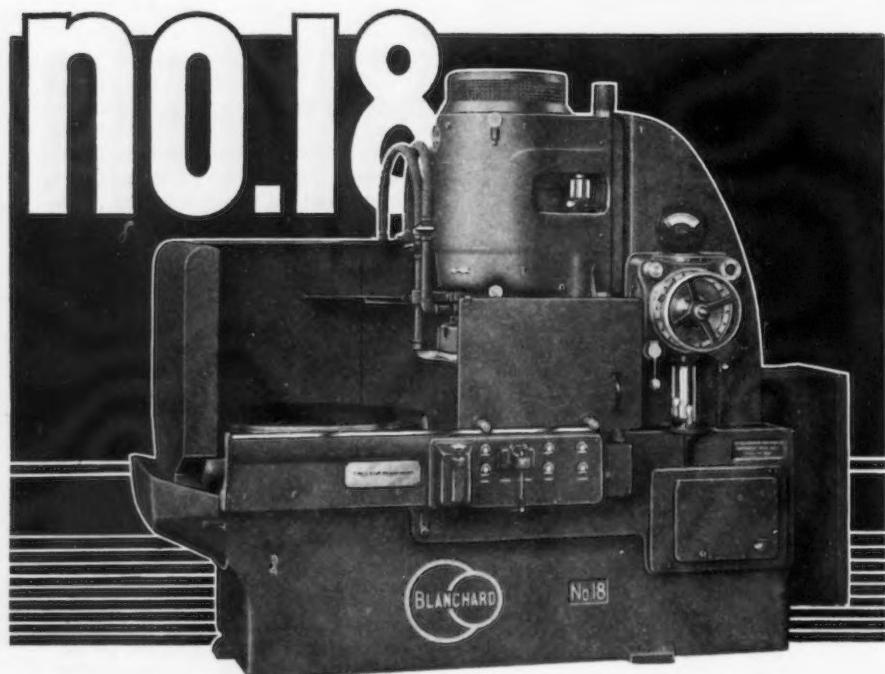
Perhaps the Major, despite pre-

tensions to the contrary, realizes that his Council was getting nowhere and that he might better give his attention to engaging in partisan politics. . . . Certain it is that his move will discredit him as a public official. . . . The harsh reaction to his move was reflected in the House of Representatives by Representative John G. Cooper, Republican, of Ohio. . . . Mr. Cooper openly charged that allocation of \$100,000 WPA money for continuation of NRA industrial research constitutes a "contribution in relief funds to the Democratic campaign chest." . . . Part of this fund is for the use of Major Berry's council. . . . Mr. Cooper said that 10 days after the funds were allocated "Berry announced the organization by himself of Labor's Non-Partisan League for the avowed purpose of aiding reelection of President Roosevelt. . . . I submit that this is a flagrant diversion of relief funds for the maintenance of a key campaign of workers." . . . Though the Major appealed to both organized and unorganized labor to join the league, it is headed by only organized labor representatives, including himself, John L. Lewis and Sidney Hillman, who are also active in trying to organize steel and other mass industries vertically. . . . "It is the intention of Labor's Non-Partisan League to enter into the campaign vigorously and to meet on the political field the efforts of the reactionary and defeatist elements who seek the defeat of the President," said the Major. . . . And while the "reactionary and defeatist elements" are to be lashed hip and thigh it is also suspected it is intended to apply the pressure to "reactionaries" in organized labor, including President William Green of the American Federation of Labor, to force them to surrender to the camp of the industrial unionists. . . . In any event, it is believed the league will provide embarrassing moments for the craft unionists. . . . And also many a wordy scrap between the two factions.



Simplified Practice on Wire Screens

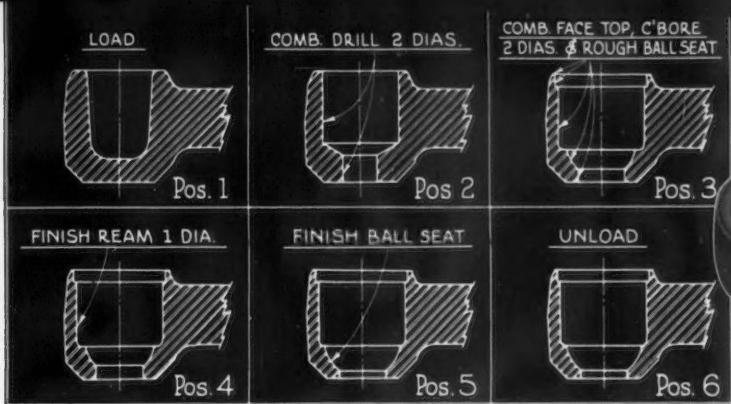
The Division of Simplified Practice, Bureau of Standards, has announced that Simplified Practice Recommendation R147—33, wire diameters for mineral aggregate production screens, has been reaffirmed without change by the standing committee of the industry. This recommendation, which covers wire diameters classified as light, standard light, standard heavy, and heavy, for specific clear open-



The No. 18 is a new addition to the Blanchard line of surface grinders. It is designed for work previously done on the No. 16 where finish must be more accurate or a higher rate of production is required. All who use or could use the No. 16 will be interested in the features of the No. 18.

Ful specifications will be sent on request.

BLANCHARD
THE BLANCHARD MACHINE COMPANY
64 STATE STREET • CAMBRIDGE • MASS.

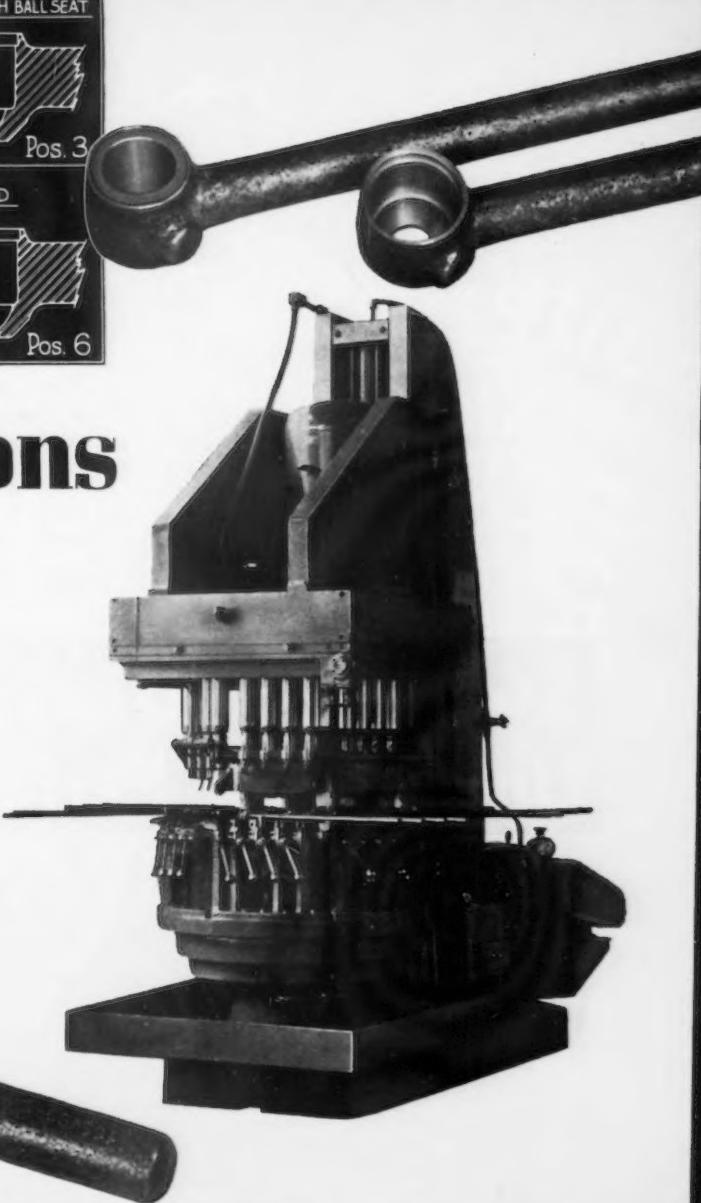


Multiple Operations on a Single Hole

• At the right is shown a NATCO vertical hydraulic driller which is performing a series of operations upon a single hole in a steel forging—four pieces at a time. The production ranges from 260 to 300 pieces per hour.

• The machine is a standard B14H driller arranged with a semi-automatic hydraulic Oilgear feed. The spindle box contains 16 roller-bearing mounted spindles complete with nose adjustment. A seven-position hand indexed rotating table was furnished complete with a seven-position fixture which is arranged to hold four forged steel drag links in each position while the operations shown in the sketch above are performed.

• In the past these forgings have been finished in an entirely different method—but this manufacturer took advantage of the possibilities of NATCO equipment and combined operations, greatly reducing production costs.



Combine Drilling, Facing, C'Boring

and Reaming...Reduce Costs

• Combining various kinds of operations leads to greater accuracy and lower costs. Now the machine may not fit in your shop—yet among the many types and sizes there is one that will fit your particular needs. Let NATCO Engineers aid you in coming to a practical and profitable solution of your "hole problems". They are ready and willing to make a complete survey

of your drilling, boring and tapping operations without any sort of an obligation. Call a NATCO representative—do it today.

• Chicago Office, 2009 Engineering Building, 205 West Wacker Drive. Detroit Office, 409 New Center Building. Factory and Home Office, **The National Automatic Tool Co., Richmond, Indiana, U.S.A.**



NATCO

Drilling, Boring
and Tapping Equipment

ings ranging from $\frac{1}{8}$ to 3 inches, was effective Feb. 1, 1933.

Copies of the recommendation may be obtained from the Superintendent of Documents, Government Printing Office, Washington, at 5c. each.

South African Dumping Duty on Pipe Imposed

The Union of South Africa has imposed ordinary dumping duties on wrought iron and steel pipe with an outside diameter up to $6\frac{1}{2}$ in. and on wrought malleable iron and steel bands and flanges

of the same sizes on shipments leaving after March 27 from the United States and Canada, according to a cablegram from Commercial Attaché Samuel H. Day, Johannesburg.

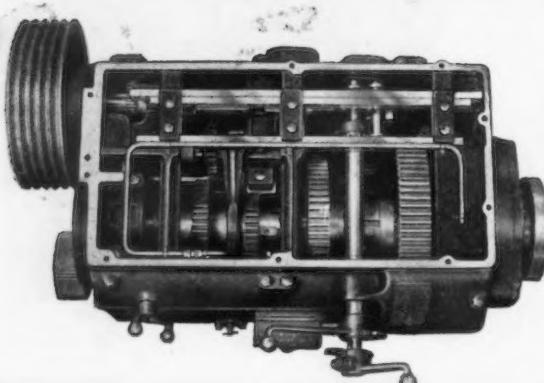
Embargo Laid on Tin Plate Scrap Exports

Exports of tin plate scrap from the United States will be prohibited from April 16 to July 16. After the latter date shipments going abroad will be permitted only upon license issued at the discretion of the President. The em-

bargo was formally announced Saturday by Secretary of State Hull as chairman of the National Munitions Control Board to which the President delegated administration of the Faddis-Barbour Act, approved Feb. 16, to control exports of tin plate scrap for the purpose of conserving tin.

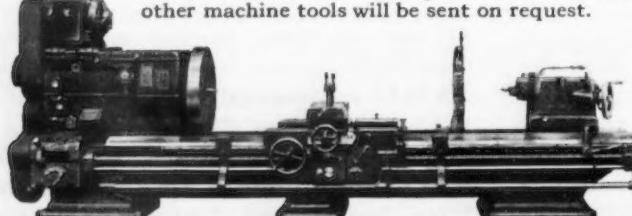
The regulations governing exports of tin plate which accompanied the executive order provisionally describe tin plate scrap as meaning tin plate clippings, cuttings, stampings, trimmings, skeleton sheets, and all other miscellaneous pieces of discarded tin plate which result from (1) the manufacture of tin plate, or (2) the manufacture of tin-bearing articles from tin plate. As thus defined, the regulations state, the term "tin plate scrap" does not include tin plate waste waste, tin plate circles, tin plate strips, tin plate cobbles, and tin plate scroll shear butts, when packed separately and sold as such, and when not intermingled with tin plate scrap.

Superior Design and Unmatched Performance



Speed control must be positive and unvarying. In LeBlond lathes the 16 selective speeds are obtained by sliding gear combinations on splined shafts that revolve on Timken bearings. Graded speed range permits selection of most productive cutting speeds. Gear shift to compound the feed and reverse direction of lead screw and feed rod is built in the head. All gears of heat treated, chrome nickel alloy steel. Hardened sliding gears are ground concentric with the bore from the pitch circle of the special stub form teeth.

SEND FOR BROCHURE—Detailed descriptions and illustrations of the many LeBlond lathes and other machine tools will be sent on request.



**The R. K. LE BLOND
MACHINE TOOL CO., CINCINNATI, O.
HALF CENTURY OF SERVICE TO INDUSTRY**

THERE is nothing mysterious about the popularity of LeBlond lathes. Through demonstrated value they have become the logical choice of the discriminating who are quick to see the outstanding advantages of LeBlond engineering.

No detail of LeBlond lathes escapes attention.

Aggregate to Withstand High Frequency Currents

THE recent development of a special sand and gravel aggregate to withstand the effect that high frequency current has on foundation and construction work has been accomplished by George F. Pettinos, Inc., Philadelphia.

The use of this aggregate in the construction of high power radio transmitting stations is claimed to have eliminated the heating of foundations caused by induction. This is mainly due to the fact that induction is not set up by the high frequency current on the minute particles of magnetic mineral found more or less common to all concrete aggregates.

A clear, concise and accurate account of metallurgy is found in "The Structure of Metals and Alloys," a monograph of 120 pages and 61 illustrations by William Hume-Rothery, recently published in London by The Institute of Metals, 36 Victoria Street, S. W. 1. The author, who is a distinguished worker and recognized authority in this field, devotes sections to the electronic background of metallurgy, the crystal structure of the elements, atomic radii of the elements, primary metallic solid solutions, intermediate phases in alloy systems and imperfections in crystals. The price of the work, bound in cloth, is 3s. 6d, post free, or about 84c.

Steel Industry Completes Arguments Against Anti-Basing Point Bill

WASHINGTON, April 7.—William A. Irvin, president, United States Steel Corp., told the Senate Committee on Interstate Commerce last Friday that a change in the present basing point system of quoting steel prices would be less harmful to the Steel corporation than to any of its competitors. On the previous day, Eugene G. Grace, president, Bethlehem Steel Corp., favoring retention of the system, said that it is a fair and satisfactory practice to both consumers and producers.

This testimony brought to an end the evidence of steel executives against the Wheeler-Utterback bill, unless plans are changed and further such testimony is taken. Senator Wheeler told THE IRON AGE he had no such plans in mind at this time. Hearings on the measure will be resumed tomorrow with the appearance of economists, the first to be Edward A. Filene of Boston. They will be suspended temporarily or permanently at the end of the present week, and, beginning Monday, the committee will take up other bills.

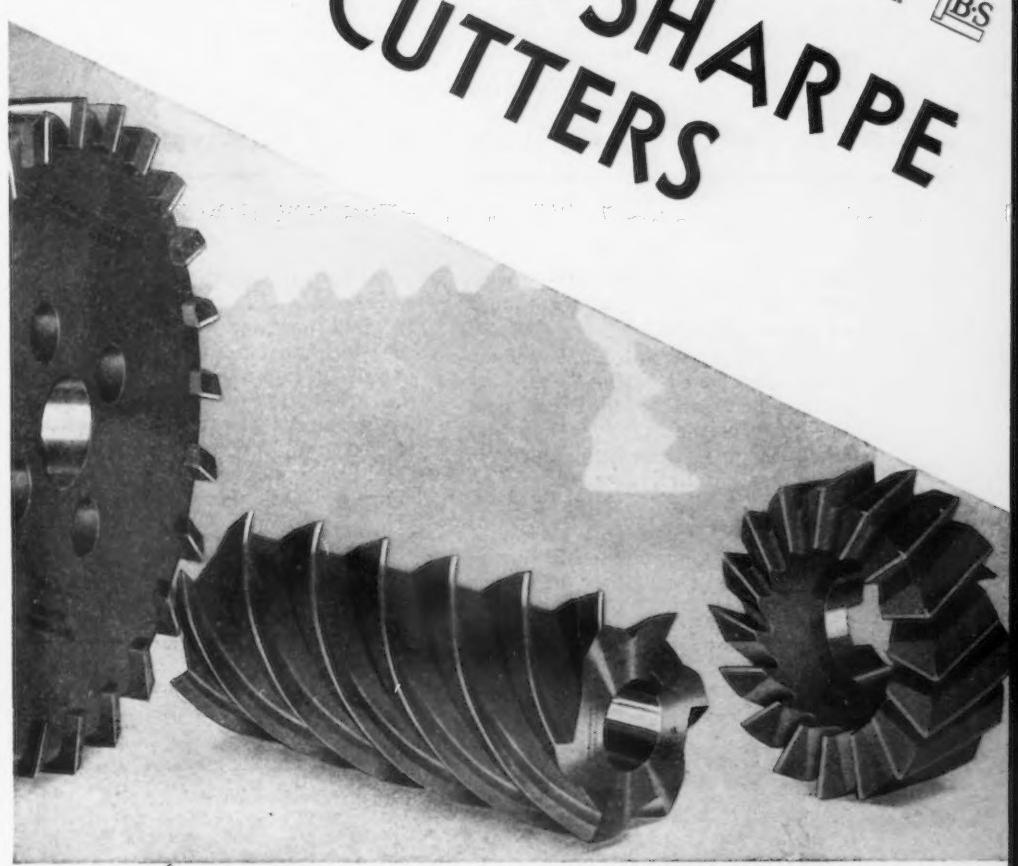
The conclusion of testimony of steel executives emphasized the view, which is almost a conviction, that the bill will not be acted upon, if at all, before the next session. It is not believed it will even be reported out of the committee. Indications are that opposition to the bill within the committee itself has grown and perhaps now represents a majority of the committee.

Mr. Grace and Mr. Irvin were

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COST CUTTING . . . PRODUCTIVE CUTTERS
essential in maintaining present day
production schedules while giving accuracy
at low unit cost. Use No. 32 Catalog as your buying guide
for GOOD cutters. Brown & Sharpe Mfg. Co., Providence, R. I. U.S.A. LBS

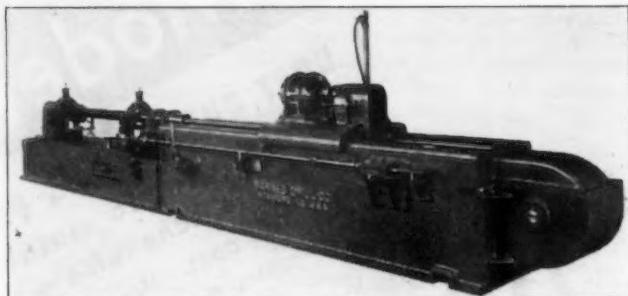


each before the committee one full day. Both made good witnesses. Contrary to a belief prevailing when they were first requested to appear before the committee, they were in no way "grilled." Senator Wheeler asked both of them sharp and searching questions at times but throughout the course of their testimony he maintained a moderate tone. It was not unusual for him to agree frequently with points both steel executives put forward. Other Senators, including those who are known for their attacks on big business, also reflected a like

attitude. The upshot was that evidence came forward much more freely and fully than could have been the case otherwise. There was a complete absence of heckling of either Mr. Irvin or Mr. Grace.

Will Not Seek Cost Records

Senator Wheeler at times suggested he would seek cost sheets from both executives but when they demurred, he apparently gave up the idea, if he actually had it in mind at all. He agreed with Mr. Irvin when the latter suggested it would not be fair to ask the Steel



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Illustrated is one of our Horizontal Internal Honing Machines. It is part of our complete line of machines for finishing cylinders, other bores and tubes of any diameter or length absolutely round, straight, and accurate to "tenths" faster than equal accuracy and quality of finish can be obtained otherwise. Honing a reamed or fine-bored hole

creates a smooth cut finish that saves "running in," improves operation, and lengthens the life of the product in which it is used. Our Internal Honers increase production, cut its cost. They also reduce inspection and assembly time, save floor space. Investigate! Get complete information on our Internal Honers and see what they can do for you.

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corporation to submit cost sheets unless a similar request were made of its competitors.

Both Mr. Irvin and Mr. Grace occasionally joked with Senator Wheeler and made the most sprightly witnesses for the relatively large audiences which heard them testify and saw them frequently "shot" by a corps of news photographers.

Mr. Irvin opposed the bill but he went further than other witnesses

when he said he thought that because of the many plants it has the Steel corporation would benefit in the long run from the change proposed by the bill. He said, however, that the Steel corporation has never sought to profit by the ruin of its competitors. Enactment of the bill, he prophesied, would bring about a drastic downward spiral of prices.

Mr. Grace declared that the basing point method of quoting has no

element of price discrimination, that under it the steel industry is highly competitive, and that views of both large and small buyers should be obtained regarding the proposed change in quoting prices. He declared that if it is the purpose of proponents of the bill to force steel prices still lower, they are making a direct attack on wage rates in the steel industry. Like Mr. Irvin he predicted the change would cause disruption in consuming industries as well as in the steel industry.

Mr. Irvin said that he thought it would be less harmful for the United States Steel Corp. to quote prices f.o.b. mills than it would be



W. A. IRVIN

The SPINDLE'S the thing!

ALLOY STEEL - CARBON STEEL

FORGED and HOLLOW BORED for
Progressive Machine Tool Builders

AMERICAN HOLLOW BORING COMPANY, 1912 RASPBERRY ST., ERIE, PA.

for its competitors to quote on that basis because the Steel corporation, unlike smaller manufacturers, has many plants located in various sections of the country. Replying to a question by Senator Wheeler, Mr. Irvin said, however, that he believed a change in the system would immediately result in a substantial evil. Referring to a statement made by Senator Moore of New Jersey, who said he had received letters from consumers saying a change would make them shift to communities nearer points of supply, Mr. Irvin cited this dislocation as one effect such a change would have.

Previously, Mr. Irvin was asked by Senator Wheeler if the former believed that objections to the basing point system were largely theoretical.

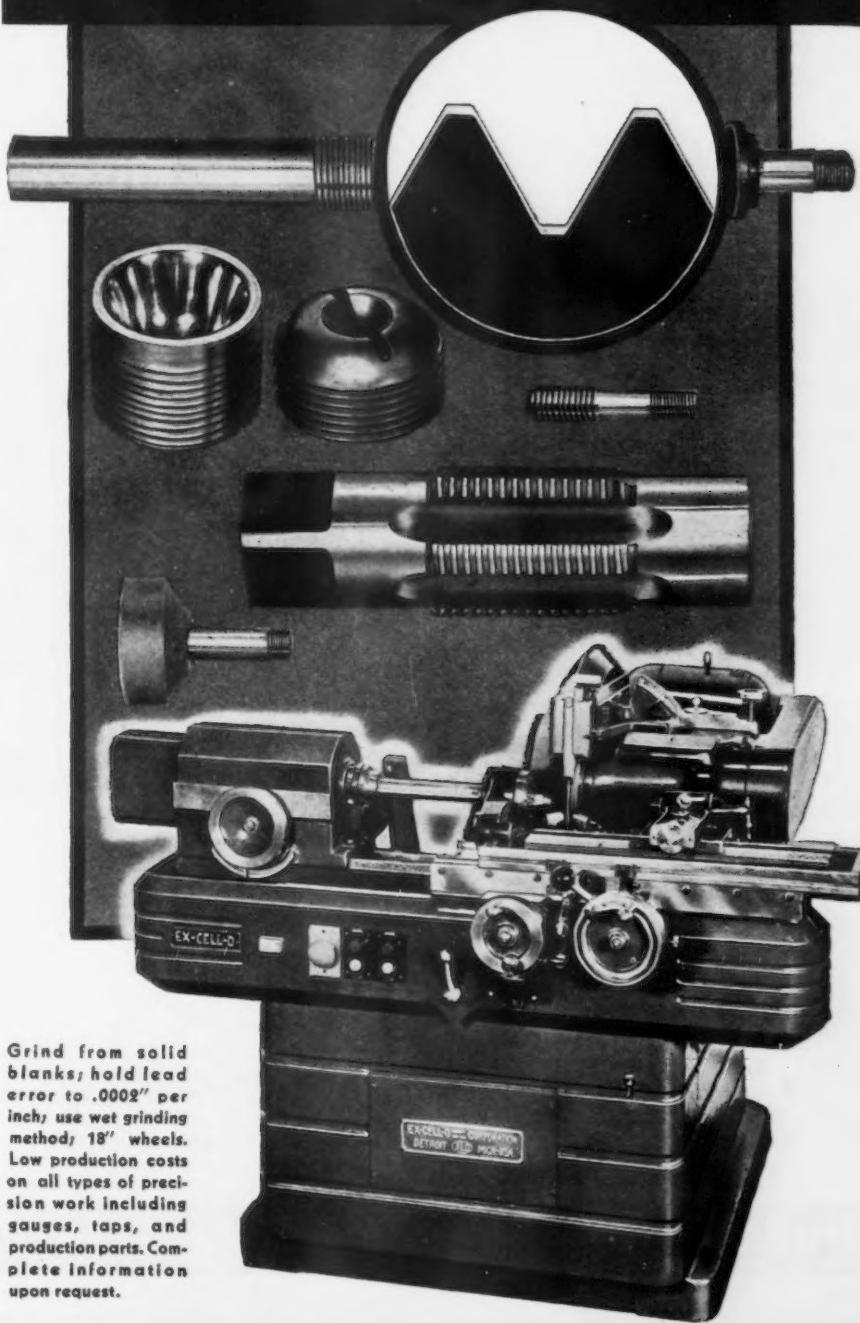
"During all of my 41 years of service with the Steel corporation," said Mr. Irvin, "we have sought to serve the public—conform to law—pay the highest going wage in the industry, and finally make profit for the 232,000 owners of our stock. The basing point practice is not the device of one man or a group of men. Like Topsy, 'it just growed.'

"The United States Steel Corp. is more than a mere corporation for profit. My problem would be much simpler if my responsibility were one of profit only. The present practice of basing point prices has been challenged. So far, we have not found a different selling program that would not damage smaller competitors and consumers who have located their plants under the present method of selling. So far, a different program that may not do untold damage to settle communities of workers and increase costs to consumers has not been found. Our minds are open to the suggestions of experts, or statute regulations by Government provided that we have an even break with out competitors and are free to serve the public in peace or war. We seek no special advantage and we are unwilling to grant an advantage to our competitors. The change as suggested would be least harmful to us of any in the industry because of our plant locations in various parts of the country and in my opinion in the long run it would be a benefit to the Steel corporation which, however, has never sought to profit by the ruin of its competitors."

Senator Couzens of Michigan asked if Mr. Irvin agreed with the philosophy of Senator Wheeler that the industry should reduce prices, even if it suffered losses temporarily, in order to increase production and in the end net greater profits by reason of greater business. Mr. Irvin read a schedule of prices of 1926 and compared them with prevailing prices to show that steel prices have been substantially reduced. He also read deficits suffered by the United States Corp. from 1931 to 1934, during the period of the lower prices, and said that in 1935 the profit was only \$1,146,000, representing a net of 15c. per ton of finished steel.

Senator Wheeler asked what the Steel corporation's contribution to the American Iron and Steel Institute amounted to and was told that it is based on sales. Mr. Irvin estimated that its contribution was

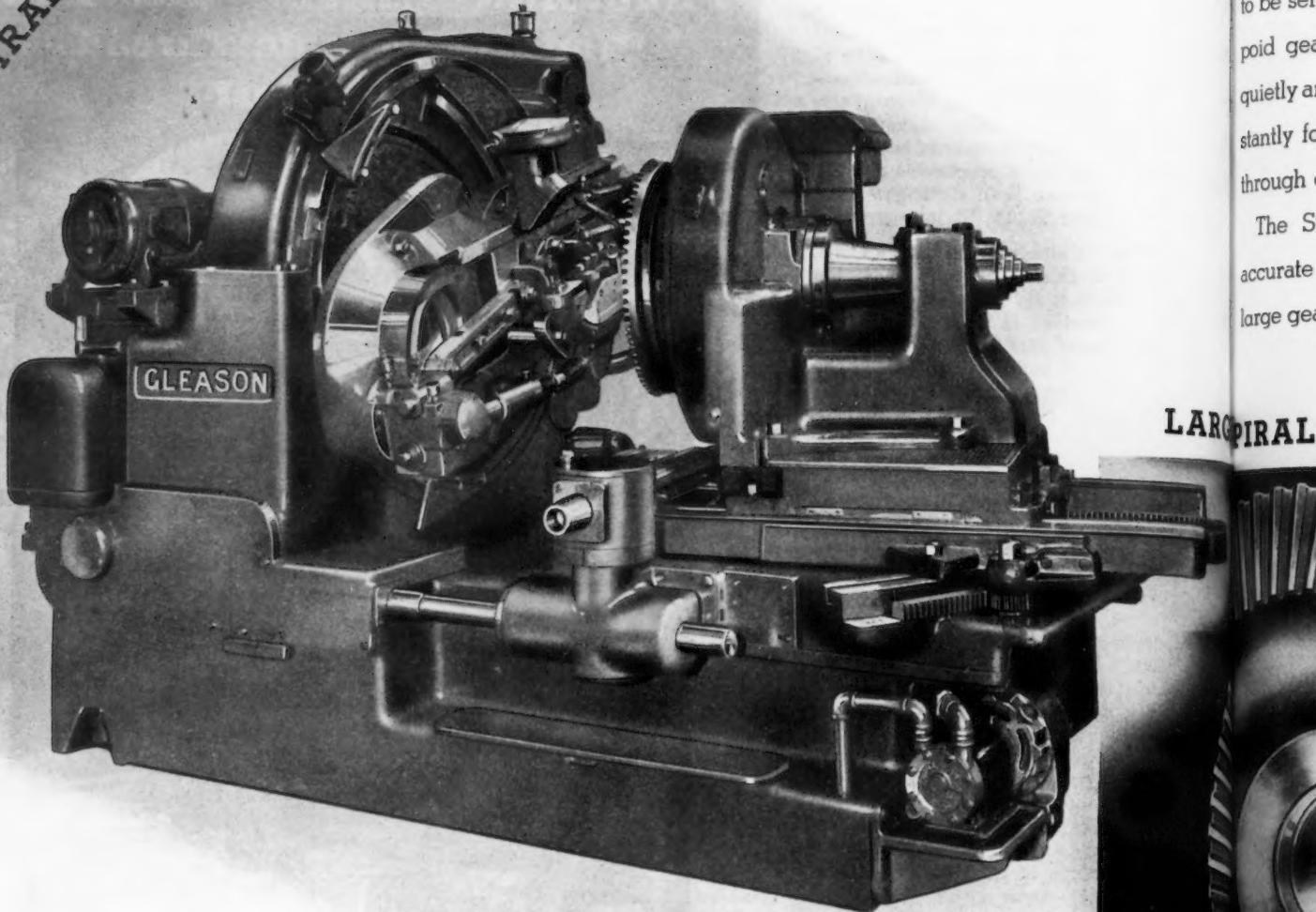
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LARGE SPIRAL

- ★ Large size curved-tooth Spiral Bevels and Hypoids are being employed as drives for:

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OIL WELL PUMPING AND DRILLING EQUIPMENT

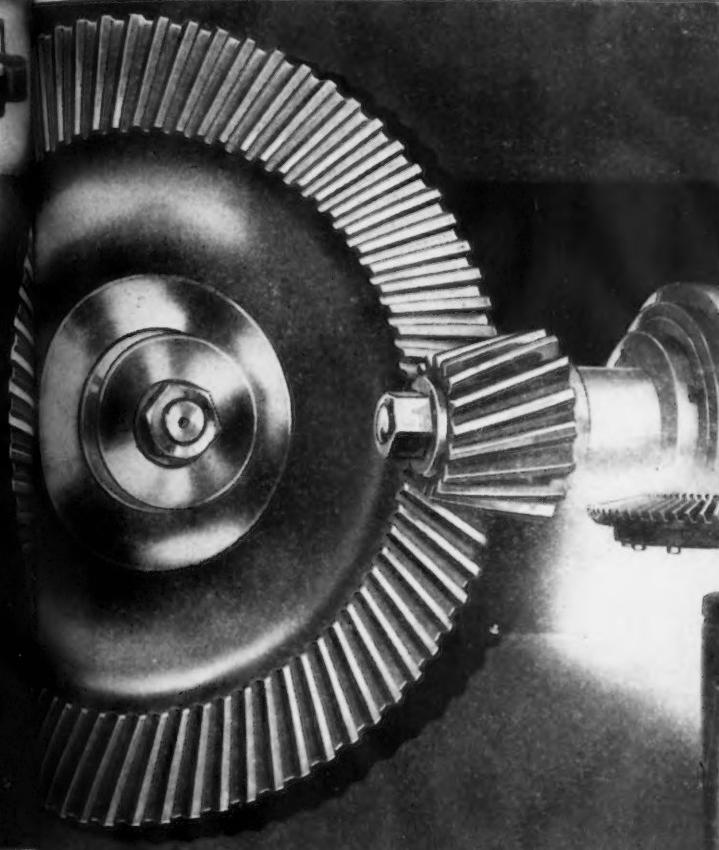
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★ Outstanding advantages of
modern bevel gearing:

The larger sizes of Spiral Bevel and Hypoid Gear Planing Generators (40"-60"-100") open new fields to be served with curved-tooth spiral bevel and hypoid gears that transmit power at high speed . . . quietly and smoothly . . . new applications are constantly found in which the smooth flow of power through gradually engaging teeth is desirable.

The Surface Hardening Machine permits the accurate uniform hardening of the teeth of these large gears . . . without measurable distortion.

LARGE SPIRAL BEVEL GEAR AND PINION



SPIRAL CURVED TEETH

Give continuous pitch line contact.

LAPPED TEETH

An added refinement for high-speed gears.

LOCALIZED TOOTH BEARING

Permits some displacement under load without impairing the running qualities.

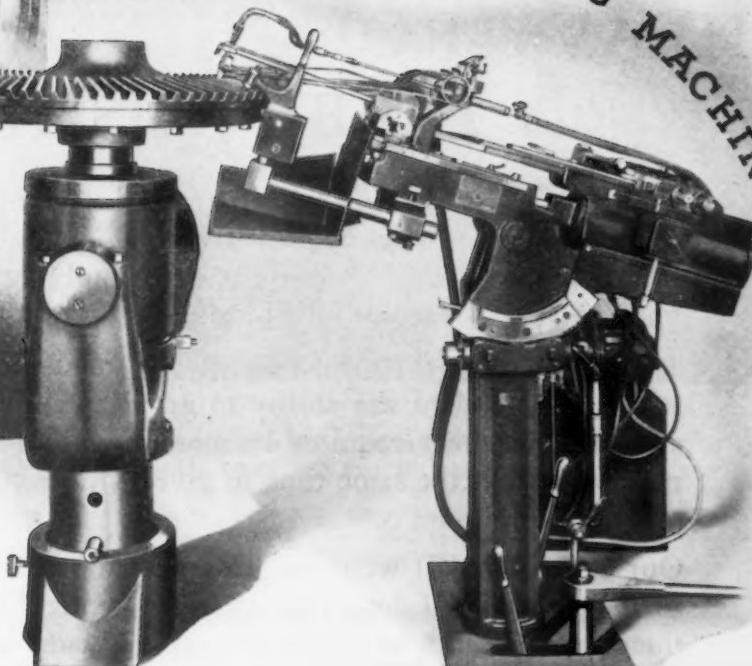
PRECISION GENERATED TEETH

Tooth form and spacing are held within very close limits for accuracy.

HARDENED TEETH

Surface hardening of the teeth eliminates distortion and gives high load-carrying capacity.

SURFACE HARDENING MACHINE.



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about \$70,000 a year, which, he said, he thought was too much.

Discussing prices quoted on Government business, Mr. Irvin said he would rather lose all the Government business than to give the Government a lower price than is given private customers. The Government, he said, is a sporadic and relatively small buyer.

When asked how the Steel corporation arrives at its prices, Mr. Irvin said it takes into consideration general conditions in the coun-

try, costs of production, based on 50 to 60 per cent of capacity, and the possibilities of the use of the material to be sold.

He told Senator Wheeler that the Steel corporation generally makes the prices in the industry unless others think the prices are too high and make their own prices. Senator Wheeler wanted to know if when THE IRON AGE announced the prices of soft merchant steel bars as 1.90c. at Chicago and 1.85c. at Pittsburgh, it asked the Steel cor-

poration. Mr. Irvin said that the Steel corporation makes its prices known to the public and the trade papers. Senator Wheeler was attempting to prove the contention that Chicago costs are less than Pittsburgh costs and therefore Chicago prices should be less.

"Do you think the effect of this bill would be a downward spiral of prices?" asked Senator Wheeler.

"I think it would immediately mean a drastic downward spiral," replied Mr. Irvin. "What the effect would be in the long run, I do not know." He predicted a downward spiral because it would not be known what the prices are. He also said, in reply to a suggestion by Senator Davis of Pennsylvania, that a downward revision of prices would result in downward revision of wages.

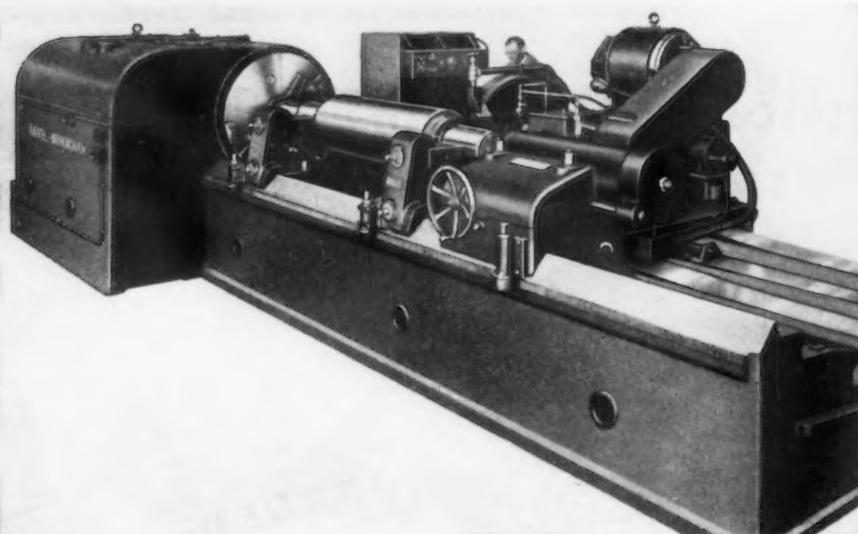
Senator Wheeler wanted Mr. Irvin to state the differences in costs of production for the Steel corporation in the Chicago and Pittsburgh districts. Mr. Irvin said he did not think Senator Wheeler wanted to pick on the Steel corporation and urged that if there is to be a "gold fish bowl all of us should be together," meaning costs of competitors also should be included. If the Steel corporation showed comparative prices, Mr. Irvin said, competitors could closely determine its costs at Chicago and Pittsburgh. Senator Wheeler said he had no desire to pick on the Steel corporation.

He asked if Mr. Irvin thought railroad rates were too high. Mr. Irvin said it was his feeling that instead of raising railroad rates during a depression it would have been a good thing to reduce them. He added, however, that all his efforts are to help the railroads and certainly not to destroy them.

Steel Corporation's Place in Industry

In opening his testimony, Mr. Irvin listed subsidiaries of the Steel corporation and the ratio of their output by products to the total capacity of the entire industry. The Steel corporation percentages were given as follows: Iron ore, 40; pig iron, 38; ingots, 38; semi-finished material, 40; heavy structural material, 42; plates, 47; rails, 54; splice bars and tie plates, 36; merchant steel bars, 28; pipe and tubes, 32; wire products, 39; tin plate and black plate, 35½; sheets, 18½; hot-rolled strip steel, 31; cold-rolled strip steel, 42; miscellaneous, 48.

When asked the prices the Steel corporation gets for rails in South America, Mr. Irvin inquired if the information really were important and suggested he did not otherwise wish to submit it to the com-



HEAVY ROUGHING or FINE FINISHING

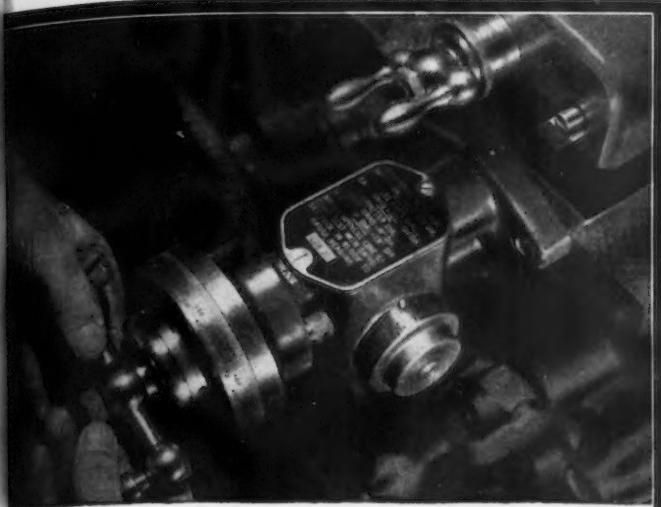
The Farrel Heavy Duty Roll Grinder does both. It is a dual-purpose machine, equally capable of taking heavy cuts in rough grinding and of applying the finest mirror surface to rolls of all types.

It is truly a *production* and *precision* machine, in which is embodied the ability to grind rolls of the accuracy and finish required by modern rolling mill practice and at the same time to give a high rate of output at minimum cost.

Our engineers will welcome the opportunity to explain the details of design which underlie the exceptional performance and operating economy of Farrel Heavy Duty Roll Grinders.

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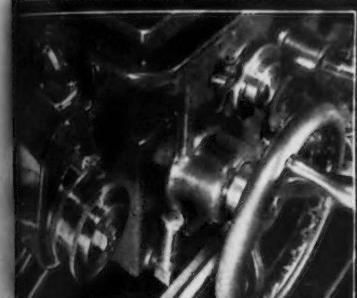


Micro-Gauging Results In Better Lathe Work: This feature is available without extra cost on all sizes of Monarch lathes. This method of tool operation eliminates "cut and try" in lathe operation. It enables the operator to quickly set turning and boring tools always in a definite relation to the center line of the lathe. He can instantly see what diameter he is turning or boring without stopping the lathe. Regarded as a great time saver.

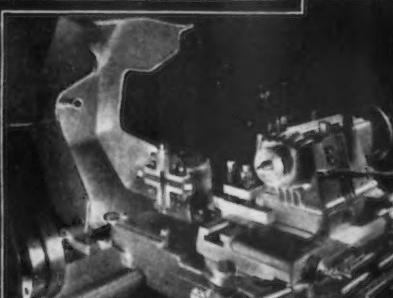
MONARCH LATHES
ARE THE MOST
PROFITABLE EQUIPMENT
I HAVE PUT IN MY
PLANT



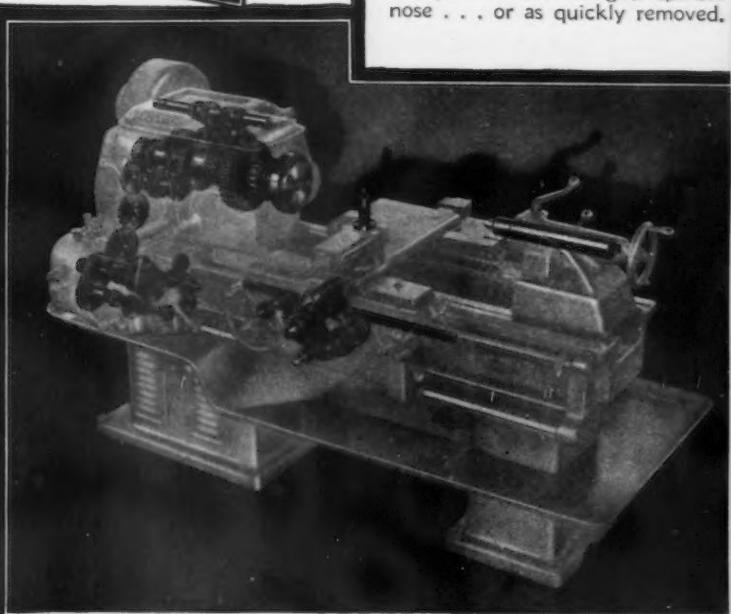
Cam Lock Flanged Spindle Saves Time: Optional standard equipment without extra cost on all sizes of Monarch lathes from 12" to 18", inclusive. It enables chuck plates and fixtures to be quickly clamped to the flanged spindle nose . . . or as quickly removed.



Length Reading Dials Speed Up Operations: Monarch Length Reading Dials are available for all sizes of Monarch lathes. They enable the operator to quickly measure the length of a turning or boring cut quicker and more accurately than is ordinarily possible.



Rear Necking, Chamfering, Forming Turret: This Turret is available for all sizes of Monarch lathes, and is made for either four tools or six tools. The turret is quickly and accurately indexed from the front of the lathe.



Monarch Is The All Heat Treated Steel Lathe: Important parts of all Monarch lathes, including all gearing, all spindles, all gear shafts, all studs, and other shafts, as well as bed rack are all made of alloy steel . . . and are scientifically heat-treated and hardened in electric furnaces. This insures that Monarch lathes will last longer and retain their original accuracy indefinitely.

MONARCH
CERTAINLY HAS MADE
BIG IMPROVEMENTS
IN LATHES
DURING THE
LAST FEW
YEARS



Single or Double Power Angular Feed Compound Rest: Monarch has furnished a large number of all sizes of lathes equipped with Single and Double Power Angular Compound Rests for the quick and accurate machining of either single or multiple angular surfaces.

THE above illustrations indicate how Monarch engineers are constantly developing new features, new devices, new uses for Monarch lathes, not only to retain Monarch's position as the recognized leader in its field, but to keep the "LATHE" the basic machine tool!

The Monarch line covers the turning field and includes the following units: Monarch Precision Tool Room Lathes—Monarch Heavy Duty Engine Lathes—Monarch Centrode Device for turning, boring and facing all shapes other than round—Monarch Keller Magna-Matic Automatic Lathe—Monarch Manufacturing Lathe, especially tooled for high production—Monarch Keller Form Turning and Boring Lathes—Monarch Semi-Automatic Manufacturing Lathe—High Speed Manufacturing Lathes.

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Here is a complete line of accurately made, finely finished sockets all standard sizes and types from tiny 5/32" miniatures to great 5" Bridge Wrench Sockets (not illustrated).

Unique to the ARMSTRONG Socket Wrench Sets is the patented Drivelock that locks socket to driver, driver to ratchet, and extension to extension—makes of each assembly a rigid tool that meets industrial requirements of strength and safety.



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"The Tool Holder People"
309 N. Francisco Ave., CHICAGO, U.S.A.
New York San Francisco London

mittee because the Steel corporation did not care to have his competitors know its figures. He said the Steel corporation gets more for its rails in South America than in the United States because of their superiority. Responding to a question by Senator Wheeler, Mr. Irvin said the industry does not need a tariff to protect it on rails and tin plate but that it does need

a tariff to protect it on the more ordinary steel products.

Citing the range of the Steel corporation's activities, Mr. Irvin said it makes 15,000 different articles. The most expensive, he said, are watch springs costing \$15,000 a ton while the cheapest in terms or dollars are steel rails. Despite the high quality of rails and the costly process of production, Mr.

Irvin said that they are sold for less per pound than any other product.

Senator Wheeler asked if the purchaser who receives delivery by water or truck is charged a delivered price which is just as high as though the product were received by rail.

"I think from the standpoint of water it is fair to the producer of material to take advantage of his natural location on water and his ability to ship by water, considering the expense he is put to in the construction of docks and other facilities for loading," said Mr. Irvin. "I think it is perfectly fair for him to take that advantage, having in mind your secondary markets, which is the conversion of your raw materials into your finished products by all the small manufacturers and they number thousands over the country."

Mr. Irvin also pointed to "the small plant down the river which locates there for fabricating purposes, getting an advantage which will dislocate hundreds of others who have placed their plants inland, fabricating the same sort of materials.

Favors Quantity Differentials

Senator Wheeler called attention to the recent quantity discounts allowed on certain flat-rolled products and asked if it were fair to sell to a large buyer at less than to a small buyer. Mr. Irvin said he considered it a fair policy to give the buyer the benefit of lower costs of production.

The Montana Senator then asked if the steel industry gives reduced prices to the Government as a large buyer. Mr. Irvin repeated that the Government is not a large buyer of steel and that it comes into the market only sporadically.

"We don't get any reduction in taxes because we are large taxpayers," facetiously said Mr. Irvin. "We paid \$38,500,000 in taxes last year." These covered Federal, state and local taxes, Mr. Irvin explained, but he said he did not object to the proportion of the taxes though he said he thought they were large taxes. They equaled \$5.14 per ton of finished steel produced during the year, he pointed out.

Basing Points Depend on Volume

Mr. Grace was questioned principally by Chairman Wheeler and Senator Shipstead of Minnesota.

He said the general practice is to establish basing points in relation to the volume of production in the industry. There is no restriction, he told Senator Wheeler, against fixing a basing point

GAMMONS TOOLS

SPIRAL SPECIALISTS
GAMMONS HOLMAN CO.
MANCHESTER, CONN.

wherever a producer may choose. When the Lackawanna plant of the Bethlehem company gets into heavier production on plates, Mr. Grace stated, it is fair to assume that Buffalo will become a basing point for plates.

When asked by Senator Wheeler about prices Bethlehem would have to quote on shipments to Chicago from Buffalo, which would mean a net below that obtaining if sales were made in the Buffalo area, Mr. Grace said that the industry is highly competitive.

"Could you sell that way without use of the basing point?" asked Senator Wheeler.

"We could if we could find out what the Chicago price was?" replied Mr. Grace.

"The basing point helps you determine what competitors' prices are at Chicago?" asked Senator Wheeler.



EUGENE G. GRACE

Mr. Grace said that it provides a method of quoting prices. It is not always true, he stated, that prices in trade papers are the market. It is then for salesmen to find out what the prices are, Mr. Grace declared.

The basing point method of quoting was declared to be a fair and satisfactory practice to both consumers and producers. It contains no element, said Mr. Grace, of price discrimination, or of price agreement and under it the steel industry is highly competitive. He said that it would be possible to

ANNOUNCING The New "S-M" Starrett



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FOR
HIGH SPEED
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Starrett offers you a faster-cutting, longer-wearing hacksaw — The New Starrett "S-M" Molybdenum Hacksaw Blade. This new saw is the result of long and careful research with new heat treating methods applied to Molybdenum. It will make more and faster cuts through hard alloys like nickel, monel metal, stainless, high speed, manganese or tool steel, phosphor bronze, etc. Starrett "S-M" blades are made in a complete range of machine and hand frame sizes and can be obtained through your regular supply house. Starrett "S-M" Hacksaw Bulletin "AA" gives information and prices. Write for it.

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World's Greatest Toolmakers
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have different prices at different plants under an f.o.b. mill system. Mr. Grace suggested, however, that consideration must be given to the some 130,000 customers of the steel industry in the United States. He inquired of Senator Wheeler if it would not be advisable to get expressions from both the larger and smaller buyers of steel. Senator Wheeler said he had received a great many complaints from consumers but agreed with Mr. Grace that there are two sides to the case. Senator Wheeler conceded he had learned this fact since the hearings began.

Following this line of testimony, Mr. Grace said that efforts to paint the basing point method as a device to fix and hold steel prices at artificially high levels, are without foundation. This line of evidence

was given both in oral testimony and in a prepared statement.

Billing Prices Declined Steadily

"As I recall the record of the Bethlehem Steel Corp., the average billing prices of steel decreased \$11 a ton from 1923 to 1935," said Mr. Grace. "This substantial decline was made possible by reductions in cost resulting from economies and increased efficiency."

"All of the benefits from lower costs have been passed on to the buyers of steel in lower prices. None of the savings was at the expense of labor. The hourly wage rate for our employees today is from 6 to 7 per cent higher than in 1929."

"I can illustrate what that means concretely by pointing out that at (CONCLUDED ON PAGE 92)



S. A. E. Announces Program for Spring Production Meeting at Detroit

THE Society of Automotive Engineers will hold its annual production meeting in Detroit, beginning April 21. A feature of this year's meeting is the fact that it combines a number of plant visits with technical sessions. The contemplated program follows:

TUESDAY, APRIL 21

2:00 p. m.—CRANKSHAFT AND CAM-SHAFT SESSION.

Chairman—K. L. Herrmann, Bantam Ball Bearing Co., and vice-president, S.A.E. production activity.

Casting and Machining of Ford V-8 Crankshafts—W. F. Pioch, Ford Motor Co.

Machining of Large Diesel Crankshafts—A. K. Antonson, Fairbanks, Morse & Co.

Development of Proferall Cast Cam-shafts—D. J. Vail, Campbell, Wyant & Cannon Foundry Co.

8:00 p. m.—BALANCING SESSION.

Chairman—W. H. McCoy, General Motors Corp.

The Influence of Balancing on Today's Automobile—S. T. Foresman, Chrysler Corp.

Production Balancing Practice—E. J. Wolff, General Motors Corp.

Electrical Indication of Unbalance—W. I. Seeger, Gisholt Machine Co.

Olsen Method of Balancing—B. E. Olson, Tinius Olsen Testing Machine Co.

WEDNESDAY, APRIL 22

1:30 p. m.—VISIT TO GREAT LAKES STEEL CORP. PLANT.

4:00 p. m.—TECHNICAL SESSION AT THE STEEL PLANT.

Chairman—V. P. Rumely, Hudson Motor Car Co.

Short talks on automotive steel and the new hot and cold roll mills by E. L. Wetstein, general sales manager, and Julius Clauss, chief engineer, Great Lakes Steel Corp.

8:00 p. m.—MACHINING SESSION.

Chairman—F. W. Cederleaf, Ex-Cell-O Aircraft & Tool Corp.

Tooling for the Packard 120 Cylinder Block—R. N. Brown, Packard Motor Car Co.

Modern Machine Cutting Tool Requirements—Joseph Wells, Pontiac Motor Co.

THURSDAY, APRIL 23

1:30 p. m.—VISIT TO ALUMINUM CO. OF AMERICA PLANT.

4:00 p. m.—TECHNICAL SESSION AT THE ALUMINUM PLANT.

Chairman—D. A. Wallace, vice-president, Chrysler Corp.

Manufacture of Elliptical Skirted Pistons—D. A. Wallace, Chrysler Corp.

6:30 p. m.—S.A.E. PRODUCTION DINNER.

FRIDAY, APRIL 24

9:00 a. m.—VISIT TO GREENFIELD VILLAGE AND FORD MUSEUM.

12:00 noon—LUNCHEON AT DEARBORN INN.

1:30 p. m.—VISIT TO FORD MOTOR CO. FOUNDRY & GLASS WORKS.

4:00 p. m.—TECHNICAL SESSION AT THE FORD MOTOR CO. PLANT.

Chairman—J. E. Padgett, Spicer Mfg. Corp.

Manufacture of Automobile Safety Glass—R. H. McCarroll, Ford Motor Co.

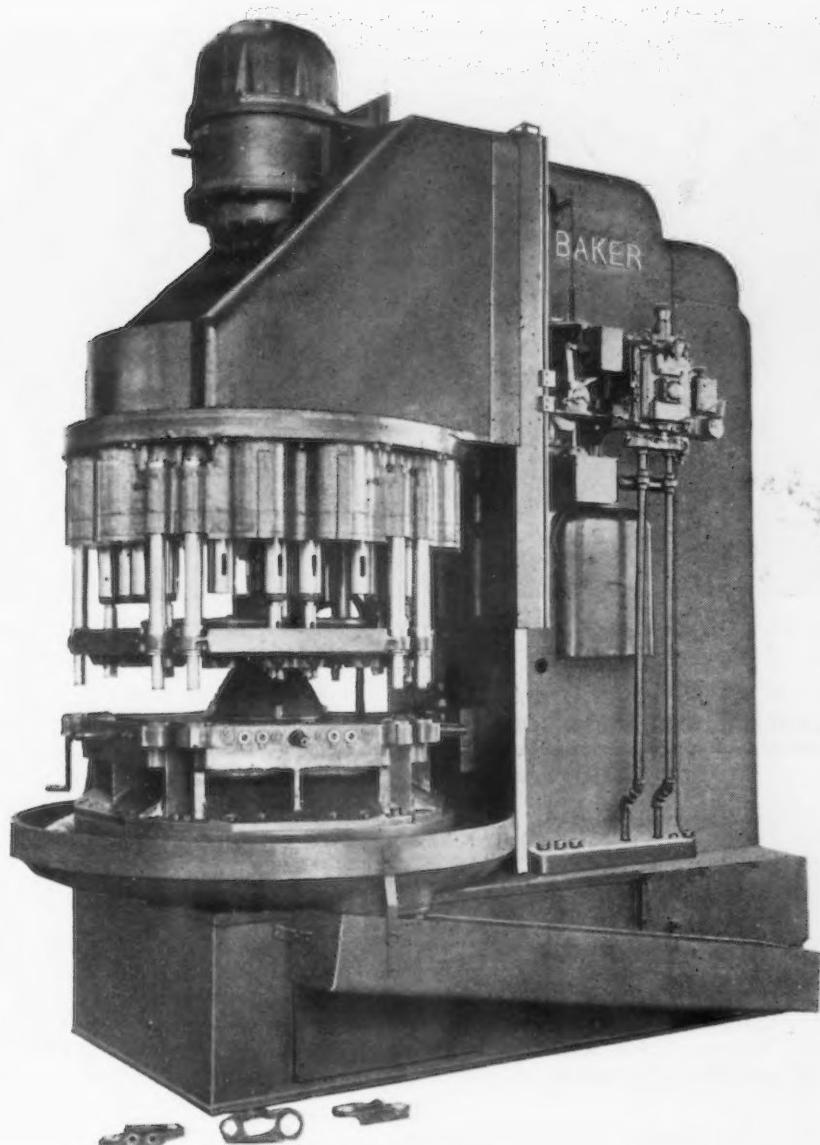
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SIMPLE AS $1+1=2$

Every executive knows that modern equipment now available is by far the most profitable investment he can make. If parts requiring drilling, boring or tapping are now being manufactured in large or medium quantities with equipment more than a few years old, a modern Baker machine may be able to effect remarkable reductions in costs.

The illustration shows a recent machine which is completely equipped with tools and fixtures for a customer's specific requirements. In this case the problem is machining two bores in tractor link forgings both right and left hand. The opera-



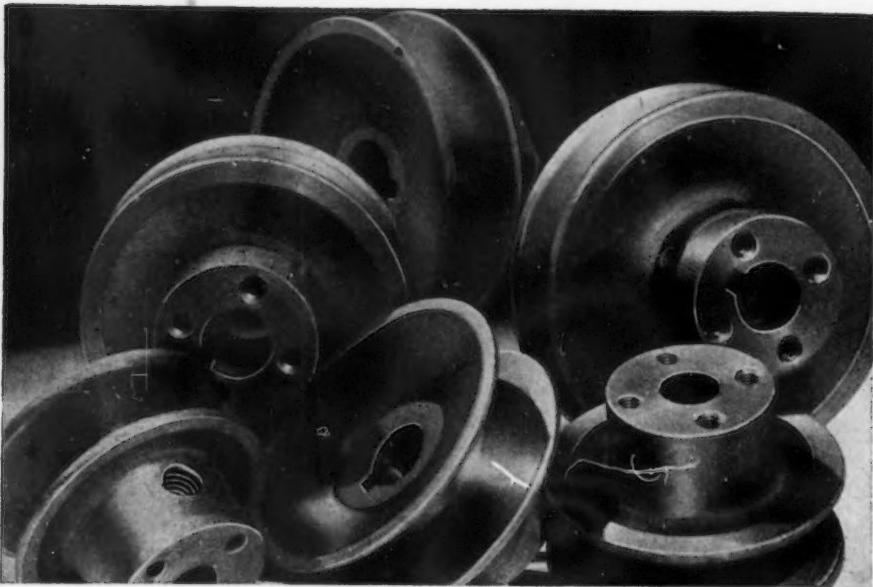
"HYDRAULIC FEED WITH 4 STATION INDEXING TABLE."

tions on this one machine consist of core drilling and reaming the two holes and rough and finish counterboring the large hole. One right and one left link are finished in each cycle of the machine, the operator loading and unloading while the cutting tools are in operation.

Perhaps in your plant you have some good sized costs that Baker can turn into profits. Submit a sample part or blue prints to our engineers. We will give our recommendations promptly.

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If it's V-Belt Cast Iron Sheaves—we are specially tooled to produce any quantity up to 18" diameter at prices that will surprise you.—Write us your requirements.

LINDERME MACHINE & TOOL COMPANY, 12251 Coyle Avenue, Detroit, Michigan

Papers Announced for Steel Engineers' Meet

EVEN papers will be delivered at the spring engineering conference of the Association of Iron and Steel Engineers, which is to be

held at Youngstown, April 22 and 23.

Among those papers to be presented will be "A Description of Carnegie-Illinois New 43-in. Continuous Hot Strip Mill," by L. N. McDonald, general superintendent, Youngstown District, Carnegie-

Illinois company. Other papers to be presented are: "Descaling Hot Steel Hydraulically," by J. E. Holbeck, sales engineer, Worthington Pump & Machinery Corp., Pittsburgh; "Circular Furnace for Ingots Heating," by M. H. Mawhinney, consultant, Salem Engineering Co., Salem, Ohio; "Tension Control in Cold Strip Rolling," by F. Mohler, industrial engineering department, General Electric Co., Schenectady; "Modern Refractories in the Steel Industry," by L. J. Trostel, chief chemist, Gen-



C. J. DUBY

eral Refractories Co., Baltimore; "Control and Recording of Rolling Mill Pressures," by M. Stone, engineer, United Engineering & Foundry Co., Pittsburgh; and "The Measurement of the Temperatures of Hot Moving Objects," by A. E. Krogh, sales engineer, Brown Instrument Co., Philadelphia.

On Thursday afternoon at the conclusion of this two-day session will be an inspection trip to the new continuous mill of the Carnegie-Illinois corporation at McDonald, Ohio.

C. J. Duby, chief engineer, Warren District, Republic Steel Corp., will preside as general secretary of the meeting.

high speed



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BLADES**

Uninterrupted Production at Full Capacity!

Only MARVEL High-Speed Edge Blades can be both strictly High Speed and at the same time *positively unbreakable*, for only MARVEL Blades have a genuine 18% Tungsten High Speed Steel edge integrally molded to an unbreakable tough alloy steel back. This combination of cutting quality and strength assures longer blade life and more cuts per blade . . . permits higher speeds and far greater feed pressures . . . permits uninterrupted production at capacity on any sawing machine.

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Die Casting Exhibit Now in New York

PROVIDING a visual demonstration of the great diversity and many special advantages of die castings, the most comprehensive exhibit of die-cast products ever held has been installed under the sponsorship of the American Die Casting Institute at Metal Products Exhibits, the permanent exhibition of metals, alloys, plastics, and finishes located in the Inter-

national Building, Rockefeller Center, New York. The display is free to the public and is open for inspection from 10 a. m. to 6 p. m. every week day until its close in the early part of May.

The die-cast products on display, which were contributed by 25 producers, include: Automobile fittings, trim, hardware, and equipment parts; parts of industrial, business, vending, and domestic machines; tools, clocks, locks, household appliances, toys, novelties, and other items. The great majority of the exhibits are made from zinc alloys, but examples of the use of alloys in which aluminum, magnesium, and other metals predominate are also shown.

Many of the exhibits are of extreme intricacy and illustrate how such parts simplify assembly and can be produced by die casting with great accuracy and rigid tolerances without machining. Other exhibits emphasize the growing tendency to use die casting for relatively large parts, thereby securing refinement of detail with economical mass production. Another group shows the applicability of die casting to the production of the odd contours required by streamlining.

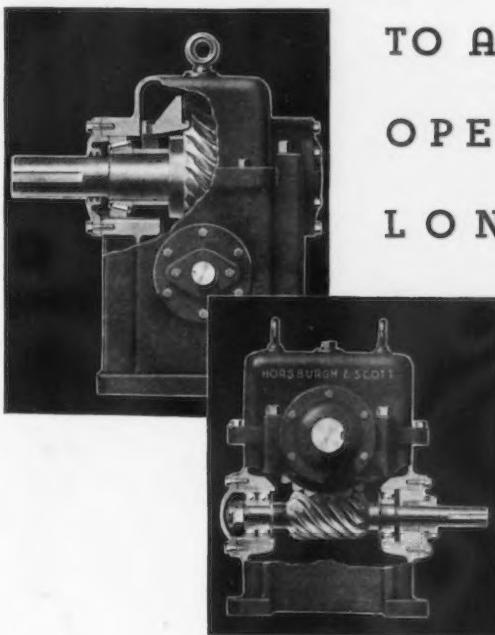
The exhibitors include: Advance Pressure Castings, Inc.; Alemite Die Casting & Mfg. Co.; Aluminum Co. of America; Badger Die Casting Co.; Benton Harbor Malleable Industries; Cleveland Hardware and Forging Co.; DeCardy Brothers Co.; Dollin Corp.; C. M. Grey Mfg. Co.; Hoover Company; Latrobe Die & Casting Co.; Mount Vernon Die Casting Corp.; New Products Corp.; Paragon Die Casting Co.; Parker White Metal & Machinery Co.; Phoenix Die Casting Co.; Precision Castings Co., Inc.; Pressure Castings, Inc.; Rupert Diecasting & Stamping Corp.; Schultz Die Casting Co.; Sterling Die Casting Co., Inc.; Stewart Die Casting Corp.; Stroh Die Moulded Casting Co.; Superior Die Casting Co.; Twin City Die Casting Co.

Welding Research Group Reorganized

PLANS for the expansion of the welding research committee of the Engineering Foundation, of which Prof. C. A. Adams, Harvard University, is chairman, have been announced. They include a new industrial subcommittee, headed by Col. C. F. Jenks, commanding officer, Watertown Arsenal, and formed to coordinate industrial welding research in this country.

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TO ASSURE SMOOTH
OPERATION AND
LONG LIFE....



*for right-angle
drives in ratios
up to 100 to 1*

Horsburgh & Scott Worm Gear Speed Reducers represent the most advanced engineering practice . . . the highest type of precision manufacture. They are simple . . . exceptionally compact. Housings are oiltight . . . dustproof. Hardened and ground worms, accurately generated gears, accurate alignment and extra heavy-duty bearings assure long life, with efficiencies reaching as high as 98%.

A complete catalog is yours for the asking.

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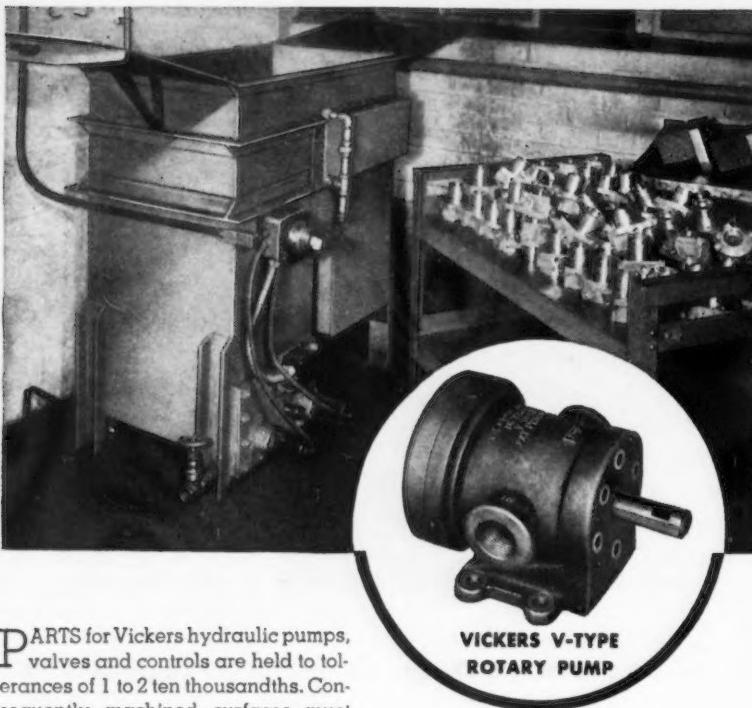
5112 HAMILTON AVENUE, CLEVELAND, OHIO, U. S. A.

Seven divisional committees are being organized to work with Colonel Jenks in studies of special fields. One will be devoted to welding of low carbon steels, with J. H. Critchett, vice-president, Union Carbide & Carbon Research Laboratories, chairman; another, headed by H. C. Jennison, technical manager, American Brass Co., will study the welding of copper alloys; and a third, under the chairman-

ship of J. C. Hodge, chief metallurgist, Babcock & Wilcox Co., will be devoted to investigations in carbon steel welding. The four other groups, the chairmen of which are to be announced, will deal with cast iron, high alloy steels, aluminum alloys, and nickel alloys respectively.

Three functional subcommittees of the industrial committee have

Why VICKERS uses DETREX DEGREASING



VICKERS V-TYPE
ROTARY PUMP

PARTS for Vickers hydraulic pumps, valves and controls are held to tolerances of 1 to 2 ten thousandths. Consequently machined surfaces must be perfectly clean for accurate gaging and inspection. The exterior must be prepared for a durable finish.

Prior to the installation of Detrex Degreasing all these parts were washed in gasoline and blown off with an air hose. Gasoline consumed, approximately 50 gallons per day by a gang of six washers.

The Detrex machine completely eliminates the former fire hazard, produces cleaner surfaces, provides for closer inspection, assures better finish and is decidedly more economical. One man handles the entire output.

Write for information bearing on your production problems.

DETROIT REX PRODUCTS CO.

Formerly Rex Products & Manufacturing Co.

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also been organized. The fields of these committees and their chairmen are: Weld stresses and their causes and effects, Everett Chapman, vice-president, Lukenweld, Inc.; analysis of weld failures, W. D. Halsey, Hartford Steam Boiler Inspection & Insurance Co.; and methods of testing, Prof. M. F. Sayre, department of applied mechanics, Union College.

A subcommittee on literature, headed by Mr. Critchett, is making a critical digest of the world's welding literature, and a subcommittee on fundamental research, with H. M. Hobart, General Electric Co., chairman, is devoted to

fostering welding research in universities. More than 60 investigations are said to be under way in various universities.

Members of the main welding research committee, in addition to Professor Adams, Colonel Jenks, J. H. Critchett and H. M. Hobart are: F. T. Llewellyn, research engineer, United States Steel Corp.; J. J. Crowe, engineer in charge of apparatus research and development, Air Reduction Sales Co.; and Dr. D. S. Jacobus, advisory engineer, Babcock & Wilcox Co. William Spraggen, 29 W. 39th Street, New York, is secretary of the main committee.

Tractor Meeting At Milwaukee

THE fourth general tractor meeting under the auspices of the tractor and industrial power equipment committee of the Society of Automotive Engineers will be held at the Hotel Schroeder, Milwaukee, April 15 and 16.

Use of tractors and industrial power equipment in highway maintenance and construction will be outlined in a paper by E. L. Roettiger, engineer, Wisconsin State Highway Commission. This will be followed by a luncheon meeting at the Schlitz Brewery and a tour, in the afternoon, of the Waukesha Motor Co. plant. The evening session will include addresses by C. R. Messinger, president, Oliver Farm Equipment Co., on "Looking Ahead with Engineers in the Agricultural Industry," and by Maj. J. K. Christmas, United States Army, who will outline the mechanization and development of army ordnance equipment, with particular reference to tractors.

A paper on engine performance and means for obtaining maximum fuel economies, by R. W. Young, Wright Aeronautical Corp., will feature the opening session on the morning of April 15. A fuel session with papers by Earl Bartholemew, Ethyl Gasolene Corp.; A. W. Lavers, Minneapolis Moline Power Equipment Co.; R. C. Chesnutt, Cleveland Tractor Co., and Prof. R. I. Shawl, University of Illinois, is planned for the afternoon of April 16.

To Feature Enamel at Cleveland Exposition

A PORCELAIN enamel building 100 x 50 ft. will be one of the features of the Great Lakes Exposition to be held in Cleveland, June 27 to Oct. 4. A portion of the building will be occupied by exhibitors of various porcelain enamel products and one section will be a cross section of a grocery store with one-half finished with porcelain enamel counters and shelves. To show a comparison between the use of steel and wood for interior finishing, the other half will have wood shelves and counters.

Enameling sheets used in the construction will be supplied by the Republic Steel Corp., American Rolling Mill Co., Youngstown Sheet & Tube Co., Sharon Steel Hoop Co., Newport Rolling Mill Co., Great Lakes Steel Corp., and Otis Steel Co.



COMING MEETINGS

Meetings in April

April 13 to 17. American Chemical Society. Semi-annual convention. Kansas City, Mo. Dr. Charles L. Parsons, 728 Mills Building, Washington, secretary.

○ ○ ○

April 16. National Council of Ship-builders. Annual Convention. Whitehall Club, New York. C. C. Knerr, 11 Broadway, New York, secretary.

○ ○ ○

April 16 to 17. American Management Association. Annual conference of production division. Hotel Statler, Cleveland. Alvin E. Dodd, 330 West Forty-second Street, New York, executive vice-president.

○ ○ ○

April 16 to 17. American Institute of Mining and Metallurgical Engineers. Open-hearth committee meeting. Hotel Statler, Detroit. L. F. Reinartz, works manager, American Rolling Mill Co., Middletown, Ohio, secretary.

○ ○ ○

April 18. Spring Manufacturers Association. Annual convention. Hotel Commodore, New York. L. A. Wheeler, 4 School Street, Bristol, Conn., secretary.

○ ○ ○

April 20 to 21. American Zinc Institute. Annual meeting. Hotel Statler, St. Louis. E. V. Gent, 60 East Forty-second Street, New York, secretary.

○ ○ ○

April 20 to 22. Concrete Reinforcing Steel Institute. Annual meeting. Homestead Hotel, Hot Springs, Va. W. S. Thomson, 201 North Wells Street, Chicago, secretary.

○ ○ ○

April 20 to 21. American Gear Manufacturers Association. Annual meeting. Adelphia Hotel, Philadelphia. J. C. McQuiston, Penn Lincoln Hotel, Wilkinsburg, Pa., manager-secretary.

○ ○ ○

April 20 to 24. Midwest Power Engineering Conference and Midwest Engineering and Power Exposition. Palmer House, Chicago. Exposition at International Amphitheatre, Chicago. G. E. Pfisterer, 308 West Washington Street, Chicago, secretary.

○ ○ ○

April 20 to 23. American Hardware Manufacturing Association. Annual convention. Hotel Peabody, Memphis, Tenn. T. W. McAllister, 1020 Grant Building, Atlanta, Ga., secretary.

April 21 to 24. National production meeting of the Automobile Manufacturers Association. Detroit.

○ ○ ○

April 22 to 23. National Metal Trades Association. Annual convention. Waldorf-Astoria Hotel, New York. Harry S. Flynn, Peoples Gas Building, Chicago, secretary.

○ ○ ○

April 22 to 23. Association of Iron and Steel Electrical Engineers. Spring engineering conference. Youngstown. Brent

Wiley, 1010 Empire Building, Pittsburgh, managing director.

○ ○ ○

April 27 to 30. Chamber of Commerce of the United States. Annual meeting. Washington. D. A. Skinner, 1615 H Street, Washington, secretary.

○ ○ ○

Meetings in May

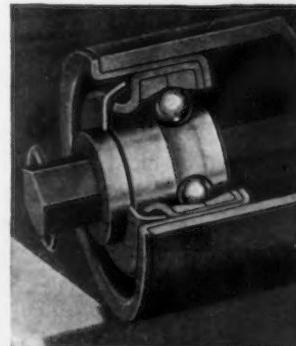
May 5. Gray Iron Founders' Society. Annual meeting. Hotel Statler, Detroit. W. W. Rose, 33 Public Square, Cleveland, executive vice-president.



**SEND FOR THIS NEW BULLETIN
ON STEEL MILL CONVEYORS**

Above: A book of practical information - contains sketches, photographs, engineering data. Below: Logan Dust Protected Bearing (patented). Outer shield, which is fixed to the stationary inner race of bearing, does not touch any rotating part. Unless packed with grease this roll revolves as freely as a plain bearing because it has no felt washers.

• Perhaps today you are not considering Conveyors. But tomorrow you may be up to the elbows in your "C" file for mill equipment. Modern business is like that —so it's best to be ready. Let us send this new bulletin on "what's new" in handling, to your desk. You will be playing safe against tomorrow's possible conveyor needs, and of course there is no obligation. Just write LOGAN CO., Incorporated, 545 Buchanan St., Louisville, Ky.



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LOUISVILLE

File Catalog Issued By Heller Brothers

A 50-page catalog has been prepared by Heller Brothers Co., Newark, N. J., manufacturers of files and rasps, in commemoration of the 100th anniversary of the founding of the company. Started by Elias Heller, who made files by hand and was forced to trade locally almost entirely because of the

limited means of transportation available in those days, the company soon grew with the expansion of trade limits by the railroads and began to make shipments throughout the country. Although opposed by distributors and consumers who thought American made files inferior in quality to those which were being imported, buyers soon were forced to realize that the American product was just as good if not better than foreign files.

Since uniform steel is essential

in the manufacture of high grade files and rasps the company erected a steel plant in 1880 near its file factory to make steel for its own use. Demand increased to such an extent in war times that a new factory was built at Newcomerstown, Ohio, modern and equipped with the latest developments in file-making machinery.

Containing illustrations and descriptions of most of the Heller line of files, this catalog provides one of the most complete and useful references to files and rasps that has been published.

Man's Nimblest Servant—Air

Air, confined in cylinders, is man's active, powerful servant throughout Industry. Air feeds work, clamps it in place, exerts predetermined pressure where pressure is needed.

Air is clean. Air is swift. It handles tremendous power with lightning speed.



"—no lapping, no grinding"

The efficiency of air power is governed by the valve controlling the air cylinder. In Detroit they make a valve that is unlike any other—a valve that restrains the giant in the cylinder, releases it in an instant—a valve that may be operated by hand, foot or solenoid.

It's the Ross Operating Valve. It's a superior valve because:

Of the poppet type, its action is more rapid.

Frictional wear does not affect the seal. There's no air leakage—and leaks are expensive!

Quickly renewable poppet seats require no grinding or lapping.

All ports are on one face. Per-

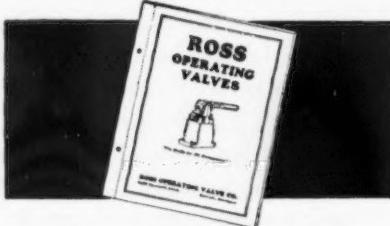
manent piping is installed in a compact bracket. In servicing, removal of four bolts dismounts the valve as a unit.

It's safe because each valve lever automatically returns to neutral and, in the case of standard models, both ends of the cylinder are open to the atmosphere. No unsuspected build-up of air pressure in the cylinder is possible.

Parts of all models are interchangeable—that reduces required stocks of service parts.

A Booklet You Should Have

Ross Operating Valves are manufactured in a plant that makes nothing else. Engineers in that plant are constantly working on air-control problems. The results of their work up to date are shown in a booklet about operating valves—it's a little loose leaf affair and should be on the desk of every



"—our work up-to-date"

executive who uses air power in his plant or builds equipment on which his customers will use air power. Write for a copy, to Ross Operating Valve Co., 6488 Epworth Blvd., Detroit, Michigan.

Alma Motor Co. Plans Early Production

THE Alma Motor Co., which was recently formed to carry on the business of manufacturing and selling front wheel and four-wheel drive units for Chevrolet and Ford trucks, is rapidly completing its plans to get into production in about 60 days. The Alma Mfg. Co., carried on this business largely on an experimental basis and the principal object of the recent reorganization was to bring in additional capital so that work could be started on a strictly production basis. Jigs and fixtures are being designed at this time with this point in view and about \$10,000 worth of additional machine tools have been purchased.

Details on the design of the front wheel drive unit are not available at present, but it is understood that some innovations have been adopted. Karl D. Kysor, vice-president in charge of engineering, was formerly chief engineer of the Cross Gear & Machine Co., Detroit, and is an authority on gears and gear construction. Cecil C. Buchner, vice-president in charge of manufacturing, up until very recently was chief engineer of Ex-Cell-O Aircraft & Tool Corp., Detroit, and is a well-known designer of automotive transmissions. William Mewhinney, plant manager, was formerly general manager of the Epworth Mfg. Co., Detroit, and is experienced in the special truck equipment field.

Other officers of the company are William W. Schenck, president; William B. Wolf, vice-president, and F. L. Armstrong, vice-president.

Executive offices of the new company have been established in the Penobscot Building, Detroit, and production will be carried on in the plant formerly occupied by the Alma Mfg. Co., St. Louis, Mich.

Survey of Pacific Coast Prepared

A SURVEY of raw materials available on the Pacific Coast for an iron and steel industry has been prepared by Edwin T. Hodge, consulting geologist, and published in four volumes by the North Pacific Division, Corps of Engineers, United States Army. Mr. Hodge, who attempted to bring all known information up to date and to provide a complete picture of all available and unavailable resources, has given detailed discussion to deposits that are now or in later years may be sources of raw minerals for a large ferrous industry.

The supplies were selected for an iron and steel industry using electric smelting methods and hydro-electric energy from the Bonneville Power and Navigation Project, to be available some time in 1937. Since the minerals are intended for a special use, a discussion is included of the peculiar materials needs and the properties of the required minerals. The report is believed to locate definitely the deposits that are worthy of consideration for a ferrous industry.

The study includes discussions of: Economic setting; market; scrap; economic factors; iron ore deposits of the western states; North Pacific Coast iron ore deposits, Alaska, Yukon and British Columbia; iron ores of Mexico; iron ores of the Central Americas; iron ores of South America; Trans-Pacific iron ores; fuels and reducing agents; fluxes and refractories; manganese, and cost of pig iron.

Further information may be obtained from Col. Thomas M. Robbins, division engineer, Corps of Engineers, Portland, Ore.

Railroads Purchased Less Than in 1934

CLASS I railroads in 1935 spent \$593,025,000 for fuel, materials and supplies, according to reports filed by the railroads with the Bureau of Railway Economics of the Association of American Railroads. This sum is a decrease of \$7,199,000 from the amount of such expenditures in 1934, and is a reduction of \$736,510,000 below 1929.

Iron and steel purchases accounted for \$156,914,000 of the total, a decrease of \$2,844,000 compared with the amount of such purchases in 1934. For new and sec-

ond-hand rails \$20,576,000 was spent, while track materials, such as fastenings, bolts, spikes, tie plates, rail anchors, frogs, switches, and crossings, required an expenditure of \$24,168,000. The purchase of locomotive and car castings, beams, couplers, frames, and car roofs cost the railroads \$22,054,000.

Other statistics show that the railroads spent a larger sum in 1935 for fuel, but less for mate-

rial and supplies than was expended in 1934. Prices for coal and other materials and supplies increased about 20 per cent from the spring of 1933 to the middle of 1934. Price levels in 1935 were only slightly lower than those of 1934. The increase in operating expenses resulting from these increased prices, due to NRA codes and general financial and economic trends is calculated at about \$100,000,000, based on 1935 operations.

Win the war of production costs with WYCKOFF COLD DRAWN STEEL

Good machine tool output demands the advantages which cold drawn steel alone can give. With Wyckoff Cold Drawn Steel, you not only obtain a complete choice of size tolerances but also a bright, smooth surface, that cuts machining costs to a minimum. Result—lower production costs, higher profits and more business. If it involves steel, let us lend our specialized experience to your particular production problem.

WYCKOFF DRAWN STEEL COMPANY

General Offices: First National Bank Bldg., Pittsburgh, Pa.

Mills at Ambridge, Pa. and Chicago, Ill.

Manufacturers of Cold Drawn Steels

Turned and Polished Shafting Turned and Ground Shafting

D.P.&V.



MIGHT BE "Detroit, Pittsburgh and 'Wheeling'", but it isn't—neither a railroad nor a new alphabetical combination—just good old Duriron Pumps & Valves. The Steel Man's first line of defense against corrosion when it comes to pickle-liquor handling equipment.

Some radio comedian crackled over the air: "It ain't the principle of the thing—it's the money." Principle doesn't enter into buying Duriron Equipment, either—it's because there is a tangible dollar-and-cents savings in using Duriron for acid pickling solutions, unloading acid tank cars and so on.

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Public Works Last Year Benefited Structural Steel Industry Very Little

THE volume of fabricated structural steel sold during 1935 was not much larger than the volume sold in 1934, according to the American Institute of Steel Construction. Final tabulations made by the institute reveal that orders for fabricated steel booked by the industry in 1935 totalled 1,068,603 tons, as against 1,054,382 tons in 1934. Shipments were 1,095,216 tons and 1,116,222 tons respectively.

Despite popular opinion, public

works failed to provide as large a market last year as in 1934. Figures show that the volume of steel going into public enterprises during any one of the past three years was less than the volume marketed during 1930, 1931 or 1932. Last year total structural steel sales were valued at \$77,000,000. Although this was higher than the \$69,000,000 value assigned to 1934, public works, comprising Federal, State and city undertakings, showed a substantial decline. The compari-

sons are \$36,500,000 for 1935 and \$40,000,000 for 1934. On the other hand, industrial purposes claimed \$22,000,000, compared with but \$13,500,000 in the preceding year. Private works accounted for \$13,500,000, or \$1,000,000 more than in 1934. Increased consumption by the railroads caused their commitments to rise from \$3,000,000 in 1934 to \$5,000,000 last year.

Spanish Orders for Tin Plate Expected

AMERICAN tin plate sales to the Galician provinces of Spain are expected to increase further through the use of the can container for beer and other liquids, according to a report received from Consul William W. Corcoran, Vigo, and published recently in *The Iron and Steel Fortnightly*.

Plans are in the course of preparation for the erection of a can factory at Vigo by a group of Spanish industrialists who engage in fish-packing and are the chief users of American tin plate now imported. In the Galician provinces alone, it is anticipated that there will be an annual consumption of from four million to six million cans. Operators in the tin-plate trade (including several agents now representing American shippers to that market) estimate that this new development will increase the present yearly Spanish consumption of the American product by ten to fifteen thousand metric tons.

Tin plate imports through the port of Vigo during 1935 totaled 128,794 cases (of 100 sheets each) weighing approximately 24,470,860 lb., which compared favorably with the 106,538 cases received in the previous year. Spanish factories at Bilbao supplied 83,447 cases of this trade, while the United States accounted for the greater part of the total received from foreign sources (45,347 cases). A considerable advance was registered in American participation (18,421 cases) in 1935 as contrasted with that in the previous year (1700 cases).

Prior to 1934, American tin plate was practically unknown on this market which was controlled by Welsh suppliers. Following the formation of the International Tin Plate Cartel in that year, a few small shipments from the United States found sale and the trend has been upward since.

Producing Movies Takes Plenty of Steel

ABOUT 3500 tons of steel played an inconspicuous but important role in the movies produced last year, according to estimates received by the American Iron and Steel Institute covering the amount of steel bought by motion picture companies during 1935.

This tonnage includes only the sheets, strips, wire, structural shapes and other steel products bought for fabrication into various forms, and does not include the steel locomotives, automobiles, furniture and other properties used to lend atmosphere to scenes in studios and on location.

In one picture steel plates, channels and structural shapes were used to reinforce the deck and sides of a reproduction of an old war galleon, and the galley slaves who provided the motive power were chained to their posts with real steel chains attached to arm and leg bands of strip steel.

Another picture consumed 10 tons of sheet and strip steel in helmets, swords and shields for 1000 men and in armor for 200 horses.

Steel has also been used to build long movable booms which enable cameramen to get into position for unusual photographic angles, and to construct the illusions of prison gates, lawn fences and lamp-posts.

Popular insistence upon movie sets that are realistic, the fact that generally it is easier and less expensive to use steel than to imitate it, and the strength and adaptability of steel are believed to be leading reasons for the varied uses of steel by the motion picture industry.

Republic Steel's 1935 Profit Was \$4,455,735

REPUBLIC STEEL CORPN. and subsidiaries, in the year ended Dec. 31, 1935, had a net profit of \$4,455,735 after depreciation, depletion and taxes, compared to a net loss of \$3,459,428 in the preceding year. Regular provision for depreciation and depletion amounted to \$8,230,200, while expenditures for repairs and maintenance came to \$11,605,765. Capital expenditures of \$4,269,396 were made during the year.

Net sales during the year aggregated \$136,164,554, which after costs and expenses resulted in an operating profit of \$17,205,434. In

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ENGINEERS AND MANUFACTURERS**

1934 net sales were \$96,824,857, and operating profit was \$8,290,660. Net current assets at the close of 1935 were \$62,300,612, having increased from \$29,506,906 at Dec. 31, 1934.

Preference stock dividends of \$1.50 a share were disbursed to stockholders Jan. 1, 1936. The amount of this deduction plus certain reserve adjustments left a net surplus of \$4,014,283 for 1935 which the corporation applied against net deficit of \$5,456,186

carried forward from the previous year. The resultant net deficit as at Dec. 31, 1935, totaled \$1,698,662.

Operations of Truscon Steel Co., acquired by Republic during the year, were not included in the corporation's consolidated income statement. As shown independently, that company sustained a net loss of \$354,782 in 1935.

Production of Bessemer, open-hearth and electric ingots by the corporation during the year total-

led 2,894,582 gross tons. Production of pig iron totaled 1,864,458 tons. Shipments of finished products aggregated 1,880,077 tons, and semi-finished products 316,325 tons. Pig iron shipments were 394,327 tons. Based on ingot production, the corporation operated at an average of 54.9 per cent of capacity during the year, compared with 40 per cent in 1934.

Consumer Goods Steel Markets Active in 1935

RISING importance of consumer goods as a major market for the steel industry was evident in a report of 1935 steel production recently issued by American Iron and Steel Institute which showed that 45.6 per cent of the steel products produced last year was classified as "light products." In 1934 light products aggregated 42.9 per cent of total production.

More than 80 per cent of the tonnage of steel sheets, strip, wire and tin plate—the principal light steel products—which can be

traced to ultimate destination is used to make automobiles, tin cans for foods, etc., furniture, refrigerators, farm equipment and similar products.

The fact that almost 12,500,000 gross tons of light steel products was required in 1935, compared with only 9,077,000 tons in 1934, is largely a reflection of increased purchases of consumer goods in which steel is used.

Aggregate tonnage of the heavy steel products such as structural shapes, plates, bars, pipe, rails and others, was greater in 1935 than in the year before, 14,897,000 gross tons compared with 12,098,000 gross tons in 1934. The 1935 production of heavy products was only 23 per cent ahead of 1934, however, as against an increase of 37.5 per cent in production of light steel. Production of all steel products in 1935 was 29 per cent above 1934.

Approximately 59 per cent of the steel industry's capacity for producing light products was required to meet the demand in 1935, while production of the same class of products in 1934 was only at 43 per cent of capacity.

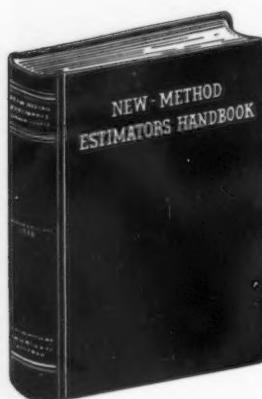
Production of sheet steel during 1935 totaled 5,537,867 gross tons—more than 70 per cent of the industry's capacity for producing this product. In 1934 sheet steel production aggregated 3,715,475 gross tons, 47 per cent of capacity.

Tin plate production in 1935 amounted to 1,657,954 gross tons, 65.6 per cent of capacity, compared with 1,510,830 gross tons, 56.7 per cent of capacity, in 1934. Production of drawn wire last year was also well ahead of 1934, a total of 931,334 gross tons being produced as against 718,594 in the year before. Strip steel production was 2,441,188 gross tons in 1935 as against 1,714,698 in 1934.

Facilities for producing heavy steel during 1935 operated at approximately 25 per cent of capacity, an increase over 1934 when heavy steel production was 21 per cent of capacity.

The tonnage of all but a few of the major classes of heavy steel products produced in 1935 was greater than in 1934. Production of 702,320 gross tons of rails last year was 31 per cent below 1934 production of 1,010,224 gross tons. Railroads also bought 421,000 gross tons of car wheels, axles, track spikes, splice bars and tie plates in 1935, a decrease from the 483,000 gross tons of these products purchased in 1934.

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CHICAGO

Columbian Employees Observe Anniversary

In celebration of its 10th anniversary, officers, department heads and veteran employees of the Columbian Vise & Mfg. Co., Cleveland, held a luncheon meeting April 1. D. C. Swander, who organized the company and since has been its president, in a brief address reviewed the activities of the company during the past 10 years. The Columbian company manufactures vises and clamps, having been formed to take over the products that had been made for 30 years by its predecessor, the Columbian Hardware Co.

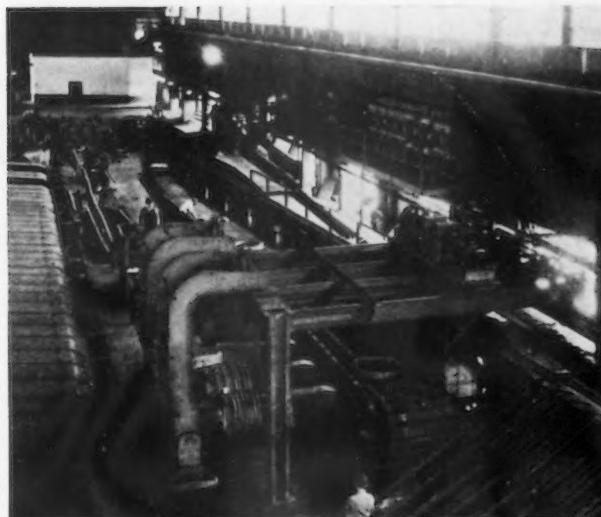
Associated with Mr. Swander as company executives are H. E. Seymour, vice-president and secretary, and A. F. Munhall, treasurer.

Nails are now being produced in 23 plants located in the Soviet Union, according to unofficial advice to the Department of Commerce. In addition the Council of Labor and Defense is said to be considering increasing the output.

Spinning of Cable On Golden Gate Bridge at San Francisco Is Being Completed

WITHIN a few weeks the spinning of more than 80,000 miles of wire that will make up the two 36½-in. cables of the Golden Gate Bridge, which links San Francisco and the North-Bay Region, will have been completed. On March 23, 37 completed strands of wire had been spun, and 1000 miles of wire was being stretched over the bay every working day. Each completed cable will embody 61 strands, and if the present spinning rate is maintained, the work will be finished before May 1.

Each of the 746-ft. towers of this project required 22,000 tons of steel. The bridge floor system, floor steel and stiffening trusses, shop and mill operations on which began in April, 1935, will consume 19,700 tons of rolled material, 9400 tons of processed materials and 3500 tons of fabricated products. Steel for the Marin approach will amount to 2250 tons, while 2200 tons will be required for the San Francisco approaches. Fabrication



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on the work of the steel superstructure of the high viaduct will involve 1040 tons. The entire job, when completed in May, 1937, will have used about 100,000 tons of steel.

Activity on the approach roads

is centered about the east approach through the Presidio on the San Francisco side and construction of the Sausalite lateral on the Marin side. Footings are being poured in concrete for the high viaduct of the east approach and pile-driving



THIS view looking north shows the transfer point of spinning operations and part of cross bridge. At this time 33 strands had been completed. In the background can be seen the top of the Marin Tower, 2100 ft. away.

is underway on the low viaduct at the site of the takeoff of the Lyon street approach.

Total employment on the job, as of March 23, was 684. Cable spinning accounted for 325 of the total number of workers; painting of the Marin approach span and high and low viaducts required 134 men; 150 were employed building the Sausalite lateral, and 75 were erecting new bungalows for 14 non-commissioned officers from Fort Winfield Scott, whose former homes were demolished to make room for a toll plaza overlooking the fort.

The Golden Gate Bridge, which is the largest single-span suspension bridge in the world, having a span of 4200 ft., will form the key link in the proposed All-Pacific Coast highway system. The first bridge ever to be flung across a major harbor entrance, this structure exceeds by more than 3000 ft. the 5800-ft. length of its nearest rival, the George Washington Bridge, New York.

Contractor for the steel superstructure is Bethlehem Steel Corp. and the chief engineer is Joseph B. Strauss.

The Crucible Steel Co. of America has leased a building to be remodeled for its special purpose at 3 Binney St., Cambridge, Mass. The company's Boston quarters have been at 540 Atlantic Avenue.



... Finished steel demand dominates British market.

• •

... Tin plates only product not affected by boom.

LONDON, April 6 (By Cable).— Owing to the heavy demand for finished steel, all other considerations have been subordinated to the attainment of increased output. Consequently the production of foundry and hematite pig iron has been curtailed, consumers rationed and export sales suspended. Months may elapse before delivery arrears are overtaken.

Billet makers are fully booked for some months and some are refusing further orders. Large tonnages are arriving from the Continent. A fresh flood of orders for finished steel is on hand and a long period of activity is indicated. Specifications for shipbuilding steel are the heaviest for years. Large consumption of structural steel in

house building is reported. A review of steel prices is imminent.

Home demand for tin plates is more quiet and fewer mills are operating. Export inquiries, notably from South America and the Continent, are fair and moderate. Sales have been made. Steady shipments are being made against old contracts.

Continental iron and steel markets are still quiet but uneasiness is present due to the international crisis.

A lessening of demand and an early release of accumulated orders is expected. Business is steady in bars and better inquiries are reported in sections. Business with the United Kingdom is uninterrupted.

International steel cartel meeting is to be April 17 for a reviewing of export prices.

British and Continental prices are published on page 117.



**• • • German Exports Rising
• • • Pig Iron in Better Demand**

HAMBURG, March 27 (By special correspondence).—German exports of finished steel products for January totaled 230,797 tons, which is the highest tonnage reported since March, 1927, and is 21 per cent above the January, 1935, trade. February exports were satisfactorily high also.

The steel industry for the first time this year used the Leipzig Spring Fair for exhibition of steel products on a large scale. Alloys and stainless steels were particularly emphasized. A new attendance record was chalked up when 26,300 foreigners visited the exhibits.

The German locomotive industry has been booking rather heavy orders recently for export. The last order included four locomotives from Brazil, 23 heavy rapid-train locomotives from South Africa and seven locomotives from Turkey.

Price reductions have been issued in Germany during the past three weeks on rivets, wood screws, foundry products, stainless steel, and certain tubes and alloy steels. Higher prices, however, are reported from England, Belgium, Czechoslovakia, Holland, Sweden and Denmark.

Orders have been placed in Ger-

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many recently for 1500 tons of steel sheet piling from Irak, as well as other quantities from various Near Eastern markets.

The German pig iron cartel reports an unusually heavy export demand. Over 8000 tons, most of which was sold on a barter basis, constitute the week's sales. The compensation agreements with Hungary and other countries have been further extended.

The combined dividend paid by the German steel industry from 1932 to 1933 was only 18.4 million marks and the combined losses, 176.5 million marks. From 1933 to 1934 dividend payments amounted to 89.8 million marks and losses had decreased to 41.7 million marks. From 1934 to 1935 conditions had further improved and shareholders received 127.8 million marks while losses were reduced to 4.7 millions. Reserve funds were increased from 1.9 million marks in 1932 to 1933 to 49.6 millions for the past year. Investments in new machinery, buildings, etc., increased from 15.8 millions in 1932 to 1933 to 83.8 million marks last year, and further expansion is planned.

The mutual territorial protection agreement between the British and Continental steel tube industry has been extended until the end of June, 1936.

OBITUARY

GEORGE BARTOL, vice-president and director, the Otis Steel Co., Cleveland, which he served as president for nearly 30 years and with which he was associated for 57 years, died April 3 after a short illness. Mr. Bartol was born in Lancaster, Mass., in 1857, and after his graduation from Massachusetts Institute of Technology he became connected with the Otis company in 1879 as a chemist. From that position he worked his way up, becoming successively superintendent and general manager and finally president. Under his direction the Lakeside plant of the Otis company, which had been placed in operation only about four years before he became affiliated with the company, was enlarged and an entirely new steel plant was built which is the present Riverside Works. In 1897, six years after a British syndicate had acquired control of the Otis Co. by purchase of two-thirds of its stock, Mr. Bartol was made manager in America and the following year president of the company. In

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1925 E. J. Kulas succeeded Mr. Bartol as president of the company and the latter was made vice-president and continued frequent contacts with the company until his last illness.

* * *

HENRY DIEGEL, for 20 years superintendent of foundries of the Allis-Chalmers Mfg. Co., Milwaukee, at the West Allis works, died March 29, aged 69 years. He became connected with the works in 1896.

CHARLES S. LOCKWOOD, who worked along with John Wesley Hyatt on the invention of the Hyatt roller bearing, died in Newark, N. J., March 20, aged 86 years. As an active member of the Hyatt Roller Bearing Co. experimental laboratory staff almost up to the time of his death, Mr. Lockwood's career covered 62 years of service in the employ of Mr. Hyatt and the companies he founded. More than 44 of these years were devoted to the Hyatt Roller Bearing Co.



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PERSONALS

ANDREW J. SNOW has been appointed assistant manager of sales in the Washington district for Carnegie-Illinois Steel Corp. Mr. Snow has spent his entire business career with the company since leaving Carnegie Institute of Technology in 1912, having served in various capacities at the mills, in



ANDREW J. SNOW

the general offices and in the sales department. He has been located in the Washington district office since June, 1931.

♦ ♦ ♦

COL. F. A. SCOTT, of Cleveland, and S. LIVINGSTON MATHER, vice-president, Cleveland Cliffs Iron Co., have been elected directors of Youngstown Sheet & Tube Co. to succeed the late John L. Severance and J. L. Agetsinger. The latter continues as general counsel for the company. Mr. Mather also was named a member of the executive committee.

Colonel Scott has long been prominently identified with Cleveland industries and is president of Samuel Mather Estate, Inc., which owns a large block of stock in the Sheet & Tube company. Colonel Scott is also chairman of the investment committee of Western Reserve University and Lakeside Hospital, Cleveland, which are also owners of stock in the Youngstown company.

♦ ♦ ♦

JOHN M. LESSELLS, consulting engineer, Swarthmore, Pa., has been appointed associate professor of mechanical engineering at Massachusetts Institute of Technology. He came to this country

from Scotland after the War and joined the research staff of the Westinghouse Electric & Mfg. Co., serving as manager of the applied mechanics division for 11 years. He later became engineering manager of the turbine and Diesel department of the company at Philadelphia, from which he resigned recently to enter consulting engineering practice.

♦ ♦ ♦

JOSEPH F. SWEENEY, formerly identified with the Cosmo Metal Alloys Corp., has been appointed special representative of Federated Metals Corp., New York, in the capacity of specialist in the purchase of nickel and nickel-bearing scrap. He was at one time with the International Nickel Co. and the Allegheny Steel Co.

♦ ♦ ♦

GEORGE LEE MILLER, who has been associated as president and works manager for the past three years with the Diebold Safe & Lock Co., Canton, Ohio, has resigned to devote his time to research work on bullet-proof steel used for armor plate.

♦ ♦ ♦

T. F. PATTON has been appointed resident counsel for Republic Steel Corp. in Cleveland. Mr. Patton was a partner in the firm of Belden, Young & Veach, Cleveland,



T. F. PATTON

whose senior partner, William P. Belden, was general counsel for the Republic Steel Corp. until his recent death. Mr. Patton has practised law in Cleveland since his graduation from College of Law of Ohio State University in 1926 and has had wide experience in legal matters relating to the steel industry.

♦ ♦ ♦

A. J. GENTHOLTS, who has been in the Republic corporation's legal department for the past six years, has been appointed assistant resi-

dent counsel with enlarged duties. The offices of the legal department will be in the Republic Building, Cleveland.

♦ ♦ ♦

W. V. PETERS, heretofore Cleveland district sales manager for the Truscon Steel Co., Youngstown, has been made manager of the steel window and door department. He entered the company's employ 17 years ago as sash salesman in the Cleveland office and subsequently held the post of manager of the steel sash and door department of



W. V. PETERS

the Detroit office and then was successively representative in the East and district sales manager of the Cleveland office.

♦ ♦ ♦

HAIG SOLAKIAN, for the past seven years chief metallurgist for Geometric Tool Co., New Haven, Conn., has been appointed research metallurgist for the A. F. Holden Co., New Haven. He received his training and his doctor of science degree from Massachusetts Institute of Technology and has been identified with the Bethlehem Steel Co., Remington Typewriter Co., and the United States Mining & Refining Co., with the last as research metallurgist.

♦ ♦ ♦

ATHEL F. DENHAM, for many years associated with the Chilton Co., Inc., has organized Denham & Co., Book Building, Detroit. The organization will be equipped to plan and execute complete development programs in the industrial and trade marketing fields.

♦ ♦ ♦

D. N. SNETSINGER has been made vice-president of the Technicoal Sales Corp., Cleveland. He has long been identified with the coal industry, having been associated

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NEW YORK, N. Y.

with the Pittsburgh & Ohio Mining Co., Cleveland, for the past 20 years. He recently resigned as sales manager of that company to take up his new duties with the Technicoal organization.

♦ ♦ ♦

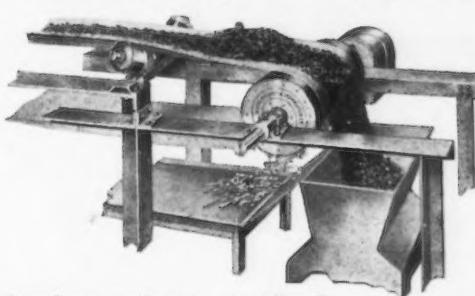
B. F. MERCER has joined the Pittsburgh Steel Foundry Corp., Glassport, Pa., and will handle steel casting sales in the Pittsburgh district. Mr. Mercer recently had been with the National Erie Corp., Erie, Pa., but previously, for many

years, had been with the Union Steel Casting Co. in operating and sales capacities.

♦ ♦ ♦

FORD LAMB, Detroit district manager, Consolidated Machine Tool Co., has been named national president of the American Society of Tool Engineers. FRANK SHULER, master mechanic, Chrysler Corp., Highland Park plant, first vice-president; LUKE BEACH, Packard Motor Car Co., second vice-president; RAY BRUNNER, Dodge

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Brothers Corp., secretary; and FRANK CRONE, Lincoln Division of Ford Motor Co., treasurer. The society has recently established a new chapter in Milwaukee and another is in process of formation in St. Louis. The new officers will be installed on April 9.

◆ ◆ ◆
GEORGE A. NEESHAM, assistant treasurer and purchasing agent of the Wyckoff Drawn Steel Co., Chicago, has been elected to the vice-presidency of district number three of the National Association of Purchasing Agents. Previous to service last year as national director of the N.A.P.A., Mr. Neesham served as president of the Chicago branch of the association.

◆ ◆ ◆
WALTER H. DIEMER has succeeded his brother WILLIAM L. DIEMER, resigned, as president of the American National Co., Toledo. The company has five plants in the city manufacturing juvenile vehicles and metal wheels.

◆ ◆ ◆
J. K. BEESON, manager of manufacturers' products sales, Pittsburgh Steel Co., has been appointed assistant general superintendent. He has been associated with the company since 1929. J. D. CASE, who has been superintendent of the finishing department at Monessen, has been named superintendent of the rod and wire mills, and will have charge of all finishing departments. He has been connected with the Monessen, Pa., plant since its establishment.

Czechoslovakian Steel Industry Making Rapid Progress, Says Trade Attache

ACCORDING to information in a recent issue of the *Iron and Steel Fortnightly* received from Commercial Attache Samuel E. Woods, Prague, "metallurgy and engineering industries which are able to compete successfully in world markets have grown up in Czechoslovakia. Consequently the foreign trade balance is always favorable. Czechoslovak exports are normally three or four times more than imports, which reached their peak level in 1929 when they were valued at \$30,518,760, veering down to the record low of \$5,852,000 in 1933. Receipts during 1935 were valued at \$8,303,160, representing an increase of 3 per cent over the 1934 value, still being considerably lower than the value of the 1929 trade, however. Exports gained 9 per cent when compared with 1934, but remained considerably below (49 per cent) the 1930 peak."

Under Czechoslovakia's present system of quotas and permits, it will be very difficult for American exporters to increase their participation in iron and steel products, it is stated. American sales to that market during 1932 were valued at \$108,400, in 1933 at \$79,600, and in 1935 reached a value of \$214,720.

Iron and steel workers of Czechoslovakia are well organized. During 1935, wages were well maintained and very little discord existed between employers and employees.

Czechoslovakia possesses easily accessible and well located deposits of iron ore as well as coal, graphite, and limestone. Iron ore reserves are estimated at some 500,000,000 metric tons (about 60,000,000 tons are visible reserves of only fair quantity and which require roasting). Large scale iron ore mining at present occurs only in Bohemia in the Silurian basin which supplies its ores to the blast furnaces of the Prague Iron Works (Karlsv Dvur and Kladno), and in Slovakia in the Spis-Gerner territory. The Silurian basin is some 180 km. long and 45 km. wide, and the Spis-Gerner district is about 200 km. long and 40 km. wide. Iron ore output during 1934 (the latest year for which statistics are available) totaled 539,000 tons with an average iron content of 32.9 per cent. The output of the one producing pyrite mine (17,920 tons) contained an average of 38 per cent iron and 42 per cent sulphur. The low quality of the domestic ore has been the main factor in stimulating imports which come chiefly from Sweden, Austria, and Yugoslavia.

Czechoslovak iron and steel prices are considerably above world levels. In 1935, they remained stable in view of the fact that producers are united in a sales cartel (representing 90 to 95 per cent of the iron and steel industry's capacity) which maintains present prices.

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TEST THIS WELDING TORCH FREE FOR TWO WEEKS IN YOUR PLANT

Completes Arguments Against Anti-Basing Bill

(CONCLUDED FROM PAGE 75)

the present wage rate with a 40-hr. work week the employees pay envelope would have a larger buying power than the pay envelope for a 50-hr. week in 1929. The number of persons employed by our company now is approximately as large as in 1929, although, of course, the rate of operations is far under the peak of that year.

"If it is the purpose of the proponents of the anti-basing point

bill to force steel prices still lower, they are making a direct attack upon wage rates in the industry. Any further substantial reductions in the steel prices at this time would adversely affect wages, because savings from increased efficiency have already been reflected in lower prices. Wages remain the only flexible factor in costs. The steel industry is committed to the principle of the highest wage rate which the business will permit.

"In keeping with the country's development, vast sums of capital have been invested in steel plants and in building up various steel producing districts and communities. If the basing point method were to be outlawed by legislation the result would be disruption and widespread dislocation for the steel industry, and particularly for small companies in the industry. The effect on many steel consuming plants would be equally severe. As a result the jobs of thousands of employees and the savings of many investors would be jeopardized.

"The charge has been made that the basing point method eliminates competition and makes for monopoly in the steel industry. If that were true a different chapter would have been written in the industry during the last 20 years. The existence of monopolistic conditions would not have permitted the growth of numerous companies, originally small, into the powerful competing units which they have become.

Institute Has Nothing to Do with Prices

"I believe it has been charged here that steel prices are dictated by the American Iron and Steel Institute, or that there are price agreements among steel producers. Such charges do not stand up before the record in the steel industry of severe price competition and small profits. As a matter of fact the American Iron and Steel Institute has absolutely nothing whatsoever to do with the fixing of steel prices."

Favors Open Prices

Mr. Grace said he was unable to say what the difference is in cost of producing steel at Chicago and Buffalo when Senator Wheeler inquired if the Chicago cost is not the lower. He wanted to know if Mr. Grace believed in open prices. Mr. Grace said he did but that he knew "We have had lots of closed, undercover prices in the United States." Senator Wheeler asked how basing prices are determined.

"We try to take into consideration the cost of production," replied Mr. Grace.

Finds Business Outlook Encouraging

Turning from the question of the basing point practice used in the steel industry to quote prices, Senator Wheeler asked Mr. Grace what the latter thought of the general outlook as to trade conditions in the steel industry.

"At the moment it looks encouraging," said Mr. Grace. "I think the second quarter production will be the best for some time past."

Senator Wheeler asked about so-called identical bids submitted on Government contracts. Mr. Grace said that when the Bethlehem Steel Corp. bids on Government business it uses its own price schedules.

"Aren't the prices all the same for the Navy?" asked Senator Wheeler.

Mr. Grace said he did not think they had been since the code period. All members of the American Iron and Steel Institute, he said, do not put in identical bids. This response was made in reply to an intimation by Senator Wheeler that institute members agreed upon identical bids for Government work.

Mr. Grace said they submit different prices but that membership in the institute has nothing to do with the situation.

Asked as to the effect of an f.o.b. mill system of quoting, Mr. Grace said he thought it would eventually increase prices and that he did not see how it would increase competition. He said he thought it would

create chaos and cause a feeling of uncertainty on the part of the purchasing public as to what prices exist competitively.

Again asked about business conditions, Mr. Grace said that there is a gradual increase in buying.

"Do you think it is a permanent pick up?" inquired Senator Wheeler.

"I think there are too many things back of it to make sure," replied Mr. Grace. "Economic things, cost of Government, high taxation, all are going to play a part to determine whether we are on the road to permanent improvement. I think there is a great deal of difference of opinion."

New Prices on High Carbon Spring Steel

THE Athenia Steel Co., 135 William Street, New York, has announced the following new base prices for cold-rolled, high-carbon spring steel and published them as follows, in dollars a 100 lb.:

Cc. .26/.50—\$2.60 Pittsburgh and Cleveland; \$2.80 Worcester.

Cc. .51/.75—\$3.45 Pittsburgh and Cleveland; \$3.65 Worcester.

Cc. .76/1.00—\$4.95 Pittsburgh and Cleveland; \$5.15 Worcester.

Cc. Over 1.00—\$6.50 Pittsburgh and Cleveland; \$6.70 Worcester.

To the above base prices must be added the new extras. This does not change the present prices, but the new set-up simplifies the manner of figuring prices.

Steel Corporation Has No Plans to Pay \$58,500,000 Dividend Arrearage

STOCKHOLDERS of the United Steel Corp. who attended the annual meeting held April 6 in Hoboken, N. J., were informed that directors of their company have no immediate plan for paying cumulative dividend arrearages on the preferred stock. Myron C. Taylor, chairman, stated that the management felt "it should see a little further into the future before committing itself to any plan."

Citing the steady improvement in mill operations since the onslaught of the depression, Mr. Taylor remarked that operations increased from 17.7 in 1932 to 40.7 per cent last year, and that latest current indications pointed to a rate in excess of 60 per cent. Nevertheless, as explained by Mr. Taylor, the corporation's plants still lack a satisfactory volume of business, due mainly to restricted movements in the field of heavy rolled products.

In keeping with this situation, it was pointed out that a conservative attitude forbade any immediate action on behalf of the preferred stockholders. To date of the latest payment, the dividend arrearage amounted to 16½ per cent, or \$58,545,679.

Criticism of officers' salaries by a stockholder present brought a sharp rejoinder from Mr. Taylor. He affirmed that compensation paid to officials of the corporation was proportionate to their ability and responsibility, and that competition for men of high caliber rendered necessary a system of reasonably generous salaries.

Reviewing recent changes in the

corporate structure of his company, Mr. Taylor emphasized the fact that altered conditions in the steel industry, new processes and inventions, and the changing temper of the industry's markets have placed a premium upon adaptability. The corporation has sought, by means of the steps it has taken, to keep abreast of the times.

Reverting to the subject of employment, Mr. Taylor said that throughout the entire depression, as well as through the life of NRA, average weekly employment in the corporation had not exceeded the 40-hr. limitation. As a consequence of the NRA, wage rates were uniformly increased, but the practice of spreading the work among the greatest possible number of employees had been adopted by the corporation prior to the advent of the steel codes. This constituted a record of which the corporation could justly be proud, Mr. Taylor concluded.



Cotuit, Mass., will take bids soon for about seven miles of pipe for water system; also for elevated steel tank, pumping machinery and other waterworks installation. Whitman & Howard, 89 Broad Street, Boston, are consulting engineers.

Rockport, Mass., plans pipe lines for water system, including new 8-in. for main supply. Cost over \$40,000 with pumping unit and other waterworks equipment.

Rockville Centre, N. Y., asks bids until April 22 for pipe for water system. H. C. Major is commissioner of public utilities in charge.

Houghton, Mich., plans main pipe line for water supply for emergency service. Cost about \$200,000 with waterworks structures. Financing is being arranged through Federal aid. Chester A. Gibbs is village engineer in charge.

Board of Baltimore County Commissioners, Towson, Md., asks bids until April 13 for about 21,300 ft. of 6, 8 and 12-in. for water system in several streets. Samuel A. Green is chief engineer.

Stamping Ground, Ky., is considering pipe lines for water system and other waterworks installation.

Berea, Ohio, plans early call for bids for about 4000 ft. of 6-in. for water system. Warren Root is city engineer.

Kingsville, Tex., plans pipe lines for water supply. Fund of \$40,000 has been authorized for this and other waterworks installation. Chamberlain & Strain, National Bank of Commerce Building, San Antonio, Tex., are consulting engineers.

Coolidge, Ga., plans pipe lines for water system; also new 50,000-gal. storage tank and other waterworks installation.

LaCrosse, Wis., plans pipe line for main water supply in Gillette Street. J. H. Barth is city engineer.

Prague, Neb., closes bids April 16 for pipe for water system. Bids recently received have been rejected. Cost about \$15,400. Henningson Engineering Co., Union State Bank Building, Omaha, Neb., is consulting engineer.

King County Water District No. 3, Mount View, near Seattle, and vicinity, care of William H. Harris, Empire Building, Seattle, will soon take bids for pipe for water system. Cost about \$16,000.

Vermillion, Kan., plans pipe lines for water systems and other waterworks equipment. Special election has been called to vote bonds for \$21,000 for project.

Preston, Idaho, plans pipe lines for extensions and replacements in present water system. Capacity of municipal reservoir will be increased. Cost about \$30,000. Financing is being arranged through Federal aid. R. G. Harding, Bountiful, Idaho, is consulting engineer.

Seattle opened bids April 8 on 176 tons of 4 to 8-in.

Salem Engineering Co., Salem, Ohio, has received an order from Inland Steel Co. for the installation of nine circular ingot heating furnaces to heat ingots for new 46-in. blooming mill, now under construction. These soaking pits will be fired with fuel oil, this being, perhaps, the largest undertaking to heat ingots with fuel oil, in existence.

THE GISHOLT MACHINE CO., of Madison, Wis.



use Ampco Metal on 1L, 2L, 3L, and simplimatic lathes for 55 different standard parts including gears, bushings, shoes, feed nuts, gibs, and keys. Ampco has so thoroughly proved its superiority over other metals for both heavy duty and precision service, that it is now an integral part of "Gisholt" quality.



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WHEELOCK, LOVEJOY & COMPANY, Inc.

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CLEVELAND

CHICAGO

NEWARK

DETROIT

March Production of Steel Ingots Establishes a Two-Year Record

OUTPUT of Bessemer and open-hearth steel ingots in March established a 22 months' record when 3,346,489 gross tons was produced, according to the American Iron and Steel Institute. Production in the preceding month totalled 2,967,803 tons, and output in March, 1935,

was 2,868,141 tons. Not since May, 1934, however, when 3,399,494 tons was produced, has output exceeded the latest figure indicated.

On a daily basis, the record is even more impressive. The daily rate during the period under review was 128,711 tons, compared with 118,712 tons in February and

110,313 tons in March, 1935. For May, 1934, daily output averaged only 125,907 tons because a longer working time was involved than last month. Operations during the period were at 58.65 per cent of capacity, and accordingly eclipsed all preceding months back through 1934.

Motor Base Has Belt Tension Dial Indicator

A STRAIGHTLINE automatic motor base, ball bearing throughout, is announced by Allis-Chalmers Mfg. Co., Milwaukee. The base provides a convenient place from which to operate the company's "Vari-Pitch" sheave. The assembly includes a V-belt tension mechanism which records existing tension on a dial indicator. Four enclosed ball bearings support the motor and the upper member of the base; the lower base member is anchored to a foundation; travel is in a straight line.

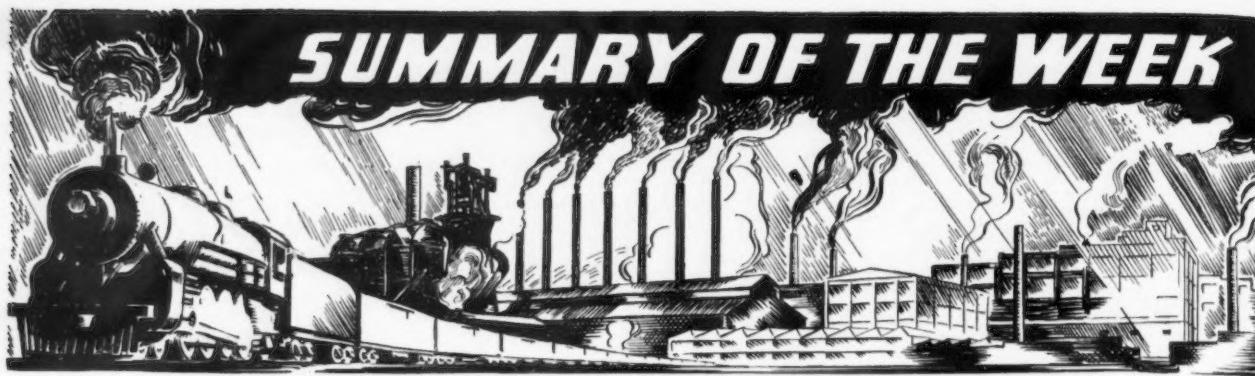
Improvements in Dust Collector Equipment

IMPROVEMENTS in the company's line of wet dust collectors are announced by Claude B. Schenck Co., 3951 Lawrence Avenue, Chicago. Bettered ability to cope with dust hazard conditions in foundries and other industrial plants having dust or fume conditions which are injurious to health, is the aim of the improved design. Included in betterments are a dirty air baffle, under the first impingement plate, an air directional baffle on the inlet side in the cyclone chamber, and a screened strainer on the sludge discharge line.

REPORTED BY COMPANIES WHICH IN 1934 MADE 97.91 PER CENT OF THE OPEN-HEARTH AND 100 PER CENT OF THE BESSEMER INGOT PRODUCTION

1934	Open-Hearth	Bessemer	Calculated Monthly Production All Companies		Number of Working Days	Per Cent of Operation
			Monthly	Daily		
January	1,786,458*	172,489	1,997,129†	73,968†	27	33.59†
February	1,993,465*	175,873	2,211,944†	92,164†	24	41.86†
March	2,540,243*	203,904	2,798,440†	103,646†	27	47.07†
April	2,622,531*	257,482	2,936,064†	117,443†	25	53.34†
May	3,003,676*	331,620	3,399,494†	125,907†	27	57.18†
June	2,718,782*	282,592	3,059,483†	117,672†	26	53.44†
July	1,340,924*	119,869	1,489,453†	59,578†	25	27.06†
August	1,245,139*	109,598	1,381,350†	51,161†	27	23.24†
September	1,127,269*	117,615*	1,268,977†	50,759†	25	23.05†
October	1,325,777*	127,789	1,481,902†	54,885†	27	24.93†
November	1,447,626*	132,059	1,610,625†	61,947†	26	28.13†
December	1,794,437*	131,467*	1,964,257†	78,570†	25	35.68†
Total	22,946,327*	2,162,357*	25,599,118†	83,312†	311	37.38†
1935						
January	2,576,671	239,858	2,871,531*	106,353*	27	48.04*
February	2,500,062	224,336	2,777,765*	115,740*	24	52.28*
March	2,582,211	230,810	2,868,141*	110,313*	26	49.83*
April	2,358,249	231,916	2,640,504*	101,558*	26	45.87*
May	2,331,297	254,796	2,635,857*	97,624*	27	44.10*
June	1,978,180	210,487	2,230,893	89,236	25	40.31
July	2,003,011	224,456	2,270,224	87,316	26	39.44
August	2,629,828	233,361	2,919,326	108,123	27	48.84
September	2,541,810	233,737	2,829,835	113,193	25	51.13
October	2,815,624*	270,719	3,146,446*	116,535*	27	52.64*
November	2,840,451	252,163	3,153,247	121,279	26	54.78
December	2,793,746	228,425	3,081,807	123,272	25	55.68
Total	29,951,170	2,835,064	33,425,576	107,478	311	48.55

*Revised.
†Adjusted.



SUMMARY OF THE WEEK

... Steel ingot production rises 3½ points to 66 per cent of capacity.

• • •

... Low prices had adverse effect on first quarter earnings.

• • •

... Finished steel composite rises slightly but is still well below January level; scrap composite declines.

• • •

... Mill backlogs promise well sustained operations throughout first quarter.

REGISTERING a 3½-point increase, steel ingot production this week is at 66 per cent of capacity, the highest level since the second week of June, 1930. While output is definitely higher in the Pittsburgh and Wheeling districts as a result of further recovery from flood damage, increases are also reported in the Valleys, at Philadelphia, at Buffalo and in the Far West. Production is unchanged at Chicago, Cleveland and Detroit.

Rolling mill schedules are also higher, with production of tin plate, strip, rails and wire products at a higher relative level than that of raw steel. Sheet mills are running at 65 per cent of capacity and many producers are booked through April at that rate. In fact, finishing mill backlogs are sufficiently large to support an ingot production of well over 60 per cent during the current month, and it is evident that the present quarter is going to be the best the steel industry has enjoyed since 1930.

WHILE steel production in the first quarter was at the rate of 54.7 per cent of capacity, early reports of steel company profits are discouraging. It is indicated that earnings were sharply curtailed because of price weakness and much of the tonnage being rolled this month will also be relatively profitless. Although recent efforts have been made to stabilize finished steel quotations, tangible results will not likely become evident until the last half of the quarter.

THE IRON AGE composite price of finished steel

is slightly higher this week at 2.097c. a lb., but is still well below the average at the beginning of the year which was 2.130c. a lb. The current level, however, is \$4.60 a net ton above the depression low of 1.867c. a lb. which prevailed in April and May, 1933.

WHILE the trend of demand for finished steel this week still seems to be upward, market tendencies are mixed. Fabricated structural steel awards of 14,850 tons are below the previous week's total of 17,150 tons and a lull in lettings is reported from many districts. New projects of 26,185 tons are considerably higher than the 14,400 tons which came out for bids in the preceding week.

Rail orders include 26,000 tons for the Rock Island, 19,100 tons for the Erie and 10,000 tons for the Denver & Rio Grande, but little tonnage is now pending. Rail lettings during the first quarter amounted to 460,000 tons, compared with 215,600 tons in the corresponding quarter last year, and current mill backlogs are sufficient to keep rail mills occupied throughout the greater part of the quarter. Mills are also being pressed for delivery of track accessories.

Automobile production continues to rise and it is now predicted that retail sales of motor cars will remain at a high level through June. Expectation of bonus payments has unquestionably stimulated automobile purchases and is expected to be a more important factor as the quarter progresses. Bonus payments are already influencing used car sales.

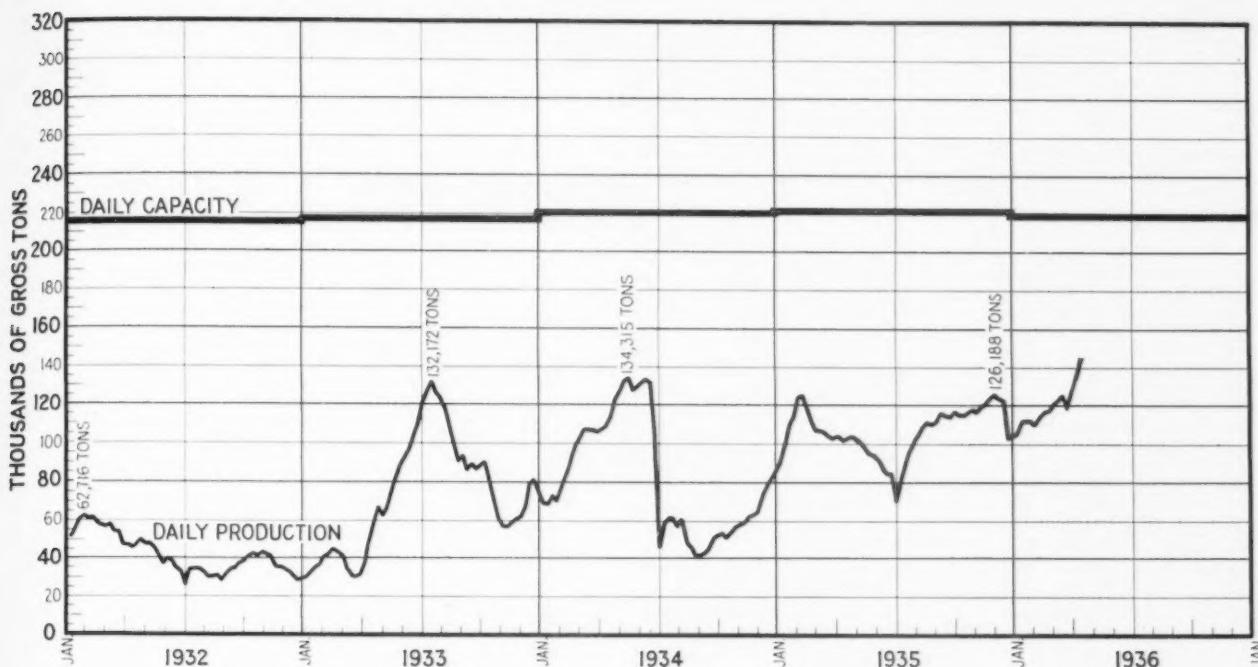
MARCH pig iron production was adversely influenced by floods, but daily output rose from 62,886 tons in February to 65,816 tons in March, a gain of 4.7 per cent. However, 126 furnaces were making iron on April 1, compared with 120 one month before, and production this month is at a much higher rate. Steel ingot production was less affected, the daily producing rate last month having been 9.4 per cent above the February level.

The scrap market has finally begun to adjust itself to moderate weather and increasing supplies of old material at Chicago have led to a 50c. a ton reduction in the No. 1 heavy melting steel quotation. As a result, THE IRON AGE scrap composite has declined to \$14.58 a gross ton, after having remained at \$14.75 a ton for six weeks. However, the Pittsburgh price of heavy melting steel has been reaffirmed by a large mill purchase. The pig iron composite is holding at \$18.84 a gross ton.

STEEL INGOT PRODUCTION

Daily Tonnage of Bessemer and Open-Hearth Steel Ingots Produced by Weeks, 1932-1936

Current Week	Last Week	Weeks Ending:			
		April 13, 1935	April 14, 1934	April 15, 1933	April 16, 1932
.....	137,170	101,836	108,994	49,835	45,415



STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

District	Current Week	Last Week	Same Week Last Month	Weeks Ending:	
				April 13, 1935	April 14, 1934
Pittsburgh	56.0	51.0	39.0	35.0	37.0
Chicago	68.5	68.5	63.0	50.0	50.0
Valleys	70.0	67.0	68.0	52.0	56.0
Philadelphia	43.0	42.0	41.0	32.0	40.0
Cleveland	82.0	82.0	70.0	54.0	58.0
Buffalo	56.0	55.0	40.0	35.0	54.0
Wheeling	80.0	76.0	80.0	77.0	68.0
Southern	67.0	67.0	67.0	50.0	54.0
Ohio River	79.0	76.0	76.0	70.0	60.0
Western	90.0	70.0	60.0	30.0	35.0
St. Louis	80.0	80.0	77.0	44.0	38.0
Detroit	100.0	100.0	100.0	88.0	100.0
Eastern	80.0	70.0	50.0	35.0	55.0
Aggregate	66.0	62.5	57.0	46.0	49.5
Average Year to Date	54.7	53.4	52.7	49.1	41.9

Weekly Booking of Construction Steel

From THE IRON AGE

	Week Ended				Year to Date	
	Apr. 7, 1936	Mar. 31, 1936	Mar. 10, 1936	Apr. 9, 1935	1936	1935
Fabricated structural steel awards.....	14,850	17,150	33,000	10,600	301,685	226,115
Fabricated plate awards.....	690	510	8,720	2,850	85,642	56,410
Sheet steel piling awards.....	300	160	0	0	15,205	5,566
Reinforcing bar awards.....	4,700	8,500	14,615	1,800	123,265	72,035
Total Lettings of Construction Steel..	20,540	26,320	56,335	15,250	525,797	400,126



... Steel production rises sharply in Pittsburgh and Wheeling districts.

... Shipments against old contracts are still in heavy volume.

... Sheet, strip and tin plate output at high level.

PITTSBURGH, April 7.—Operations in the Pittsburgh district have continued their recent rise and production this week is up five points to 56 per cent of capacity. In the Wheeling district output is up four points to 80 per cent. As was the case last week, increased production is due to the mills making up for recent curtailment, and also to the pressure for clearing books of first quarter contracts.

While some interests seem to believe that the acceleration in production is due in some measure to anticipatory buying, there is little evidence that material is not going into consumption. On some items, such as sheets, where there were indications that consumers were buying more than their usual tonnage, it developed that some manufacturers have asked the mills to ship the material earlier than their first instruction. On those items on which prices were reaffirmed, and on which concessions were not prevalent during first quarter, specifications are coming in at a fairly steady rate. This is especially true of hot-rolled bars of which a fair tonnage is being received from automotive and miscellaneous sources. Demand for cold-drawn bars continues to improve with both automotive and implement makers increasing their requirements.

Specifications for heavy material for railroads are still coming in, and, with the approach of spring weather, it is expected that orders of this type will materially increase.

Structural awards during the past week were mainly of a public works nature, no outstanding private jobs having been in evidence. Seasonal requirements from consumers of wire products have made

their appearance, and it is expected that this type of material will move more freely this year than last, because of persistent demand from the agricultural regions.

Emphasis on sheets at this time is entirely on production, with a few inquiries for second quarter delivery having made their appearance. It will be several weeks before the new method of selling sheets will be tested to any extent. Sheet production this week is at approximately 65 per cent of capacity. Tin plate production continues its movement upward, with large releases being placed for packers' requirements, "beer plate" and miscellaneous items. Export orders are also showing satisfactory volume, and tin plate production this week is at approximately 77 per cent of capacity.

Strip operations this week are at approximately 74 per cent of capacity, with the local interest making every effort to move first quarter tonnage out of the mills. There are very few, if any, specifications for second quarter delivery and, as in the case of sheets, three or four weeks will be needed before consumer reaction toward the new setup in prices has crystallized.

Pig Iron

With most of the foundries in this district back on their regular schedules, pig iron is moving in normal fashion with orders being filled on a hand-to-mouth basis.

Semi-Finished Steel

Emphasis in this market is on production. Shipments to non-integrated mills have been heavy, due to large movements of finished steel products from these plants. Movement of sheet bars continues

at a good rate. At least two or three weeks will be required to give a test to the recent change in prices. Although the formal quotations represent a decline from first quarter prices, the latter during part of that period were nominal and the new prices on billets and slabs constitute, in reality, an increase.

Bolts, Nuts and Rivets

Business in this market continues at the recent rate of improvement, with specifications being placed by railroad and miscellaneous interests. Future prospects from some of the "heavy industry" customers appear to be good.

Bars

Although interest in this market centers on production, nevertheless fair specifications from automotive and miscellaneous sources have made their appearance during the past week. Movement to round out first quarter contracts will probably continue for another week or so, and prospects of a continued flow of orders for bars seem to be good.

Reinforcing Steel

Accelerated movement of reinforcing steel, due to releases on contracts, continues. As yet formal reaffirmation of first quarter prices has not occurred in this district, and for the time being no orders are being accepted for second quarter delivery. Material on specific jobs, the contracts for which were closed during the first quarter, will in many cases be moving for quite some time due to the late starting of projects. Bids on a Department of Agriculture building at Washington, involving 4000 tons, will be taken some time this month.

Cold-Finished Bars

Both production and demand in this market continue to improve. There has been an increase in automotive buying, and specifications for material for the agricultural regions is coming in at a faster rate. Among some of the orders for the farming regions is material required in making such items as cream separators, showing that farm purchasing power has and will probably continue to reach out farther than has been the case during the past two years.

Sheet Steel Piling

Specifications for sheet piling have been a little slow during the past few weeks. However, orders for second quarter delivery are coming in. An award has been granted local interests by the New York State Procurement Division

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous;
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	April 7, Mar. 31, Mar. 10, April 9,	1936	1936	1936	1935
No. 2 fdy., Philadelphia.....	\$21.3132	\$21.3132	\$21.3132	\$20.26	
No. 2, Valley furnace.....	19.50	19.50	19.50	18.50	
No. 2 Southern, Cin'ti.....	20.2007	20.2007	20.2007	19.13	
No. 2, Birmingham†.....	15.50	15.50	15.50	14.50	
No. 2 foundry, Chicago*.....	19.50	19.50	19.50	18.50	
Basic, del'd eastern Pa.....	20.8132	20.8132	20.8132	19.76	
Basic, Valley furnace.....	19.00	19.00	19.00	18.00	
Malleable, Chicago*.....	19.50	19.50	19.50	18.50	
Malleable, Valley.....	19.50	19.50	19.50	18.50	
L. S. charcoal, Chicago.....	25.2528	25.2528	25.2528	24.04	
Ferromanganese, seab'd car-lots	75.00	75.00	75.00	85.00	

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

	Per Gross Ton:				
Rails, heavy at mill.....	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2
Light rails, Pittsburgh.....	35.00	35.00	35.00	35.00	
Rerolling billets, Pittsburgh.....	28.00	28.00	28.00	27.00	
Sheet bars, Pittsburgh.....	28.00	28.00	28.00	28.00	
Slabs, Pittsburgh.....	28.00	28.00	28.00	27.00	
Forging billets, Pittsburgh.....	35.00	35.00	35.00	32.00	
Wire rods, Nos. 4 and 5, P'gh.....	38.00	38.00	38.00	38.00	
Cents	Cents	Cents	Cents	Cents	
Skelp, grvd. steel, P'gh, lb.....	1.80	1.80	1.80	1.70	

Finished Steel

	Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....		1.85	1.85	1.85	1.80
Bars, Chicago.....		1.90	1.90	1.90	1.85
Bars, Cleveland.....		1.90	1.90	1.90	1.85
Bars, New York.....		2.20	2.20	2.20	2.13
Plates, Pittsburgh.....		1.80	1.80	1.80	1.80
Plates, Chicago.....		1.85	1.85	1.85	1.85
Plates, New York.....		2.09	2.09	2.09	2.08
Structural shapes, Pittsburgh.....		1.80	1.80	1.80	1.80
Structural shapes, Chicago.....		1.85	1.85	1.85	1.85
Structural shapes, New York.....		2.06 1/4	2.06 1/4	2.06 1/4	2.05 1/4
Cold-finished bars, Pittsburgh.....		2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh.....		1.85	1.85	1.85	1.85
Cold-rolled strips, Pittsburgh.....		2.60	2.60	2.60	2.60

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Finished Steel

	Per Lb.:				
		April 7, Mar. 31, Mar. 10, April 9,	1936	1936	1935
		Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....		2.40	2.40	2.40	2.40
Hot-rolled annealed sheets, No. 24, Gary.....		2.50	2.50	2.50	2.50
Sheets, galv., No. 24, P'gh.....		3.10	3.10	3.10	3.10
Sheets, galv., No. 24, Gary.....		3.20	3.20	3.20	3.20
Hot-rolled sheets, No. 10, P'gh.....		1.85	1.85	1.85	1.85
Hot-rolled sheets, No. 10, Gary.....		1.95	1.95	1.95	1.95
Wire nails, Pittsburgh.....		2.10	2.10	2.10	2.60
Wire nails, Chicago dist. mill.....		2.15	2.15	2.15	2.65
Plain wire, Pittsburgh.....		2.40	2.30	2.30	2.30
Plain wire, Chicago dist. mill.....		2.45	2.35	2.35	2.35
Barbed wire, galv., P'gh.....		2.60	2.50	2.50	3.00
Barbed wire, galv., Chicago dist. mill.....		2.65	2.55	2.55	3.05
Tin plate, 100 lb. box, P'gh.....		\$5.25	\$5.25	\$5.25	\$5.25

Scrap

	Per Gross Ton:				
Heavy melting steel, P'gh.....	\$15.75	\$15.75	\$15.75	\$15.75	\$11.50
Heavy melting steel, Phila.....	13.75	13.75	13.75	13.75	10.00
Heavy melting steel, Ch'go.....	14.25	14.25	14.25	14.25	9.75
Carwheels, Chicago.....	14.00	14.00	14.00	14.00	10.50
Carwheels, Philadelphia.....	14.75	14.75	14.75	14.75	11.25
No. 1 cast, Pittsburgh.....	15.25	15.25	15.25	15.25	12.25
No. 1 cast, Philadelphia.....	14.25	14.25	14.25	14.25	11.00
No. 1 cast, Ch'go (net ton).....	12.50	13.00	13.00	9.00	
No. 1 RR. wrot, Phila.....	13.25	13.25	13.25	10.75	
No. 1 RR. wrot, Ch'go (net).....	13.00	13.25	13.25	8.00	

Coke, Connellsville

	Per Net Ton at Oven:				
Furnace coke, prompt.....	\$3.65	\$3.65	\$3.65	\$3.65	\$3.85
Foundry coke, prompt.....	4.25	4.25	4.25	4.25	4.60

Metals

	Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.....		9.25	9.25	9.25	8.75
Lake cooper, New York.....		9.37 1/2	9.37 1/2	9.37 1/2	9.12 1/2
Tin (Straits), New York.....		47.25	47.20	48.30	49.25
Zinc, East St. Louis.....		4.90	4.90	4.90	4.00
Zinc, New York.....		5.27 1/2	5.27 1/2	5.27 1/2	4.35
Lead, St. Louis.....		4.45	4.45	4.45	3.50
Lead, New York.....		4.60	4.60	4.60	3.65
Antimony (Asiatic), N. Y.....		13.50	13.50	13.25	14.25

The Iron Age Composite Prices

Finished Steel

April 7, 1936	2.097c. a Lb.
One week ago	2.084c.
One month ago	2.084c.
One year ago	2.124c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products represent 85 per cent of the United States output.

Pig Iron

	\$18.84 a Gross Ton
	18.84
	18.84
	17.90

Steel Scrap

	\$14.58 a Gross Ton
	14.75
	14.75
	10.42

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

1936.....	HIGH	LOW	1936.....	HIGH	LOW	1936.....	HIGH	LOW
2.130c., Jan. 7; 2.084c., Mar. 10	\$18.84	Jan. 7;	\$18.84	Jan. 7;	\$13.33	Jan. 7	\$14.75	Feb. 25;
2.130c., Oct. 1; 2.124c., Jan. 8	18.84	Nov. 5;	17.83	May 14	13.42	Dec. 10;	10.33	April 23
2.199c., April 24; 2.008c., Jan. 2	17.90	May 1;	16.90	Jan. 27	13.00	Mar. 13;	9.50	Sept. 25
2.015c., Oct. 3; 1.867c., April 18	16.90	Dec. 5;	13.56	Jan. 3	12.25	Aug. 8;	6.75	Jan. 3
1.977c., Oct. 4; 1.926c., Feb. 2	14.81	Jan. 5;	13.56	Dec. 6	8.50	Jan. 12;	6.43	July 5
2.037c., Jan. 13; 1.945c., Dec. 29	15.90	Jan. 6;	14.79	Dec. 15	11.33	Jan. 6;	8.50	Dec. 29
2.273c., Jan. 7; 2.018c., Dec. 9	18.21	Jan. 7;	15.90	Dec. 16	15.00	Feb. 18;	11.25	Dec. 9
2.317c., April 2; 2.273c., Oct. 29	18.71	May 14;	18.21	Dec. 17	17.58	Jan. 29;	14.08	Dec. 3
2.286c., Dec. 11; 2.217c., July 17	18.59	Nov. 27;	17.04	July 21	16.50	Dec. 31;	13.08	July 2
2.402c., Jan. 4; 2.212c., Nov. 1	19.71	Jan. 4;	17.54	Nov. 1	15.25	Jan. 11;	13.08	Nov. 22

for a bulkhead, involving about 300 tons, to be used in New York.

Plates and Shapes

Shipments of material contracted under first quarter prices continue at a rapid rate. Some specifications from railroad interests continue to come in. Producers are pinning their hopes of improvement for the heavy industries material on a better construction business this spring.

Private building is for the most part conspicuous by its absence, with the majority of inquiries and awards being in the class of public works projects. This week's inquiries were featured by the Central Nurse's Residence at the Welfare Island Hospital, New York, involving 1800 tons, while bids are being asked for 670 tons for a Children's Hospital at Castleton Corner, Staten Island, N. Y. The balance of the inquiries cover various highway bridges, no doubt portraying in some measure the replacements necessary due to flood ravages. Most structural awards this week were small in tonnage, with the exception of one for the Kanawha River bridge at Charleston, W. Va., involving 2030 tons. The Dravo Contracting Co. has been awarded the contract for two large lock gates to replace those recently destroyed by the flood at the Emsworth, Pa., dam. The amount involved is 240 tons of plates and shapes. This company also has the job of building a temporary coffer dam.

Tubular Products

There has been a slight increase in orders for oil-country goods during the past week, and specifications from other sources continue in steady volume. Many warehouses are replenishing some of their stocks which were greatly depleted during the past three weeks on rehabilitation jobs. A local gas company will build a small gas pipe line across the Conemaugh River in Black Lick Township, Pa. Jobs of this type make up some of the miscellaneous business being booked.

Wire Products

Production and shipment of material contracted under first quarter prices takes the center of the stage in this market, with specifications for second quarter delivery practically being non-existent. Orders are being received for wirenails which are being quoted during the second quarter at prices equal to those actually received during the first quarter. Two or three weeks will probably be necessary before second quarter prices which reflected increases will be tested.

However, with seasonal requirements soon to exert their influence, specifications in the wire market will probably continue to show improvement. Production of wire products will probably continue at a good rate for some time, due to exhaustion of supplies both at mills and warehouses following the pressure for consumer delivery over the past several weeks.

Sheets

Sheet production this week is at approximately 65 per cent of capacity. Shipment and production are taking precedence over specifications at this time, and due to the fact that movement of steel on old contracts will take place the greater part of this month there is little likelihood that new sheet quotations will be really tested for two or three weeks. However, a few inquiries for second quarter delivery have appeared. Over the past several months export business has shown up quite well in relation to total tonnage placed, and there is evidence that orders from this source will continue. While there has been a tendency, due to possible stiffening of prices, toward anticipatory buying, nevertheless it is the opinion of some producers that the majority of this material will be consumed quicker than at first thought. In some instances buyers have written in asking that the shipping dates be moved up.

Tin Plate

Tin plate production this week is at approximately 77 per cent of capacity. The volume of orders being received is showing steady improvement. Specifications for packers' requirements have shown a good improvement during the last week and general line can requirements are also holding their recent pace. Can makers seem to feel that requirements for crop canning this year will be in much better volume than that experienced last year. Incidentally, as with sheets, export business has shown a satisfying percentage of the aggregate demand.

Strip Steel

One of the leading producers in this district was able, due to technical reasons, during part of last week to maintain more than normal production, causing a sharp rise in operations for that week. This mill has now returned to normal production, and operations are at approximately 74 per cent in the industry. Emphasis is being placed on movement of material from the mill to consumers with practically no inquiries for second quarter delivery. Bookings being

shipped are comprised of automotive and miscellaneous tonnages, with a small amount of material going to implement makers. Reaction by consumers of the quantity differential set up for second quarter strip prices has been both favorable and unfavorable. However, due to possible heavy stocking of material contracted under first quarter prices, it may take a little while to test the efficacy of the new method of merchandising.

Coal and Coke

Activity in the coal and coke market is rather dull at this time, as domestic consumers are not buying and industrial users are returning to normal requirements. Producers in this district are waiting for the movement to the Lake, which is expected to be of greater moment this year, inasmuch as the Mid-West experienced such a severe winter.



. . . Agricultural products active. . . .

. . . Structural steel is more quiet.

ST. LOUIS, April 7.—A seasonal improvement is noted in galvanized roofing and fencing, and the movement of other items of finished iron and steel is steady. Structural shapes are slow, and fabricators in the district are complaining of the lack of inquiries. Private work is said to be held up because of the uncertainty of the Federal tax situation, and public projects are becoming fewer in number.

The Laclede Steel Co. has been awarded 300 to 400 tons of reinforcing bars during the last two weeks for small highway projects in Missouri and Illinois. Missouri will open bids Friday for highway bridges requiring 520 tons of structural steel. Fruin-Colnon Contracting Co. has been awarded the general contract for the St. Louis Dairy Co. building requiring 200 tons of reinforcing bars.

Shipments of pig iron show improvement over the first week of last month. The second quarter opened with some buying, although there were no big orders placed. There has been some let-up in operations in the Belleville stove district. The melt in the agricultural-implement sections continues heavy.



... Steel production maintained at 68½ per cent of capacity.

... Farm implement makers active with production of harvesting equipment getting under way.

... Scrap market declines as pent up winter's supply begins to appear.

CHICAGO, April 7.—The steel market is holding all gains and prospects are excellent for April. Both new sales and specifications for finished steel compare favorably with the best so far this year. New prices are holding, though much low-priced tonnage will move this month on orders taken in March.

Ingot output appears to be firmly pegged at 68½ per cent of capacity, and it is possible that it may climb on the basis of heavier country demand for wire products, pressure for deliveries for most grades of sheet mill products and the prospect of heavier expenditures of public money for programs that were planned last year but are only now beginning to come to life.

Farm implement manufacturers are preparing to buy steel for combines and other harvesting machinery and at least six weeks more of top capacity production of tractors seems to be assured. The Rock Island is buying its rails and an extensive track rehabilitation program is being planned by the National Railways of Mexico.

The scrap market is now beginning to show the effects of the hard winter which checked normal activity in that field. The release of the winter's accumulation is depressing prices, but it is still a moot question whether these suddenly made available supplies can hold prices down or whether they are like a flash in the pan and can depress the market only for a short period, probably not longer than three to four weeks.

Pig Iron

New sales are in good volume as melters continue to make com-

mitments for the second quarter. Releases in early April show up very well, but the month is too young to take these early returns as an indication of what will take place in the next three weeks. Automobile foundries in western Michigan are busy.

Rails

The Rock Island has started to make purchases and so far has closed for 26,000 tons. Distribution by the Erie is expected in the near future and it is reported that the National Railways of Mexico will put down heavier steel between Lorado and Mexico City. Formal orders have been issued by the Nickel Plate, which announced distribution a week or 10 days ago. Miscellaneous orders for track supplies total 3000 tons.

Bars

Both sales and specifications have jumped up sharply due to the greater need by automobile plants. These consumers promise to take heavy shipments, not only in April, but also in May and possibly in June. Local sellers count on the month of May because of the lateness of the season and look for June to boost automobile sales because of the bonus money that will then be available. The fact of the matter is that anticipation of bonus money is now leading to increased sales of used cars. In this way the old automobile market is being aided, and it is argued that many second hand cars sold now on the basis of bonus money will result in trades on new cars when the money is actually made available. Tractor plants are still producing full tilt and prospects are excellent that there will be no

let-down for about six weeks. In the meantime, agricultural implement manufacturers are preparing to buy steel for runs of combines and other harvesting machinery.

Reinforcing Bars

The foundation of this market is public work with only an occasional small lot to be used in private construction. The Sanitary District, Chicago, has closed on 1300 tons and will soon buy 900 tons. Bridge programs in Illinois and Indiana each call for 1000 tons. Wisconsin road and bridge projects are being dribbled out in small lots. Most new awards are for small tonnages on which prices are holding if for delivery in the immediate Chicago area.

Plates

Releases are heavier, but there is no major consuming industry that is drawing heavily against mill schedules. Purchases have been made during the week by road machinery builders, farm equipment manufacturers and tank builders. There have been about the usual runs of requirements by steel fabricators. The needs of railroad car builders have been disappointingly small, though tonnages for this purpose are soon to be made known.

Structural Material

A bombshell was exploded in this market at the end of the week when Washington ordered all bids on the Outer Bridge, Chicago, thrown out and has indicated that it will listen only to tenders on the basis of splitting the work into four or five parts. All told, there is about 15,000 tons of steel involved that now will not reach mills for another five to six weeks. There are no major awards in this territory, the aggregate of all lettings being less than 1000 tons. New inquiries total 8000 tons and with the exception of 500 tons for a dredge, they are all for bridges in Illinois, Texas, Indiana, Missouri and Minnesota.

Wire Products

Price variations are less frequent, but there will be much low-priced tonnage delivered this month. Most producers had at first planned to complete bargain shipments by April 15, but the flood upset schedules and now it will be May 1 before the full effect of the new prices will be felt. Jobbers and farm areas are larger consumers, and in some cases mills are being put to real tests to meet the exacting and prompt delivery demands being made by distributors. Demand for manufacturers'

wire is brisk and it promises to remain so for some time to come.

Cold Rolled Strip

Schedules have improved since the dip caused by floods and output has again reached the 70 per cent of capacity mark. General users are more liberal in their specifications and automobile plants are exerting real pressure for prompt deliveries of many sizes.

Sheets

Order books are well filled for April, but much low-priced tonnage will be shipped during this month. Requirements of automobile plants are heavy and there is no let-down in the use by farm implement manufacturers who are now preparing for harvesting machinery schedules which will take liberal quantities of galvanized and other sheet mill products.

Cast Iron Pipe

A veritable flood of releases is reaching foundries with the result that March shipments were the best for any third month in about five years. Sales are also improved, having set the best March record in four years. Most current work has its base on the WPA, and many public jobs are now falling that were first brought up for discussion five to six months ago. Foundry stocks are shrinking and April, like March, promises shipments in excess of production. Prices are firm.



... Steel and pig iron buying slow in South.

• •

... Ingot production unchanged.

BIRMINGHAM, April 7.—The steel and pig iron markets are on a routine basis. New business is mostly in small lots. Pig iron buying is slower than steel, which has also slowed down somewhat from the March rate. Jobbers and dealers bought actively last month in anticipation of firmer prices this quarter. Foundries closed out old contracts and for the present are well stocked. This will affect second quarter buying for the time being.

Blast furnace and open-hearth

operations continue at a steady rate, without change in number. Twelve blast furnaces and 15 open-hearth are active.

Bids will be opened this week on steel pipe for Birmingham's industrial water system.



... Canadian steel plants run at 75 per cent.

• •

... Plant additions under way.

TORONTO, April 6.—New business continues to appear in good volume in the Canadian iron and steel markets and most plants associated with the industry are running at peak levels for several years past. Sir Newton Moore, president, Dominion Steel & Coal Corp., Sydney, N. S., stated that the steel plant during 1935 maintained an average operating rate of 74½ per cent, and the rate for the current year is expected to maintain or exceed this record. The Steel Co. of Canada, Hamilton, Ont., and the Algoma Steel Corp., Sault Ste. Marie, Ont., are holding to a similar operating rate, and both companies have announced plans for plant additions involving expenditure of several hundred thousand dollars. Foundries and other plants have been increasing operations and now are said to be running around 60 per cent capacity.

No large contracts were placed during the past week or 10 days, but there has been no slackening in spot demand for iron and steel and their products. The steady flow of small business is enabling most companies to hold backlog at a high level. Manufacturers of cars, locomotives and general railroad equipment are running close to capacity on contracts received last year and there is a hope that further business will be awarded before present orders are completed. The automotive industry is maintaining its former high operating rate working on new cars for spring delivery and is taking substantial quantities of sheets, hardware, castings, etc.

The building trades are showing improvement and recently two or three new projects were announced

that will involve around 5000 tons of structural steel. Demand for mining machinery is holding at a high level. Many plants are replacing worn and obsolete machinery with the result that machinery and tool builders report general improvement in sales over a year ago.

In the merchant pig iron markets business is slow but improvement is being registered and sales now are holding around 1200 tons per week. Individual sales, however, range from 50 to 300 tons with the average around 100 tons. A few melters have placed contract for second quarter delivery but the majority are adhering to the policy of hand-to-mouth buying. While demand for the week mostly was for foundry iron, sales of malleable iron totaled approximately 700 tons and a couple of hundred tons of basic was sold in the Montreal area. Inquiries for iron are increasing and local blast furnace representatives look for further improvement in sales as the spring advances. Pig iron production is holding around 40 per cent of blast furnace capacity.



... Pacific Coast activity centers in Los Angeles area.

• •

... Oregon pipe line may take 5000 tons of plates.

SAN FRANCISCO, April 6.—Activity during the past week appears to have been confined largely to southern California, where an extensive school construction program is well under way and industrial building is affording fair steel tonnages. Plans are being completed for factory additions for the Consolidated Aircraft Co. at San Diego in which 1000 tons of structural steel will be involved.

In northern California new projects are few and steel awards, aggregating 3908 tons of bars and 1146 tons of shapes, are being withheld on eight projects on which bids have been opened. Among these are the Alemany Boulevard sewer at San Francisco, two storage tanks at Sacramento, and the livestock building at San Mateo, in which 960 tons, 797 tons and

941 tons of bars and 1000 tons of shapes respectively will be involved.

It is possible that the Pacific Fruit Express Co. may place contracts this week at San Francisco for 3000 refrigerator cars involving 16,400 tons of structural steel, 4500 tons of sheets, 8500 tons of castings, 24,000 wheels and 12,000 axles. Considerable differences have arisen, it is reported, on whether the cars will be built in the East and "deadheaded" to the Coast or be assembled in a western yard.

Salem, Ore., expects to vote on bonds soon for the construction of an 18-mile pipe line in which approximately 5000 tons of plates will be required. A state overhead crossing at Portland, Ore., bids April 16, includes 760 tons of bars. The Treasury Department continues to be active in its purchases of minor tonnages for various relief projects on the Coast.



... Steel consumers well stocked.

◦ ◦

... Production holds at high rate.

CINCINNATI, April 7.—While the demand for sheet steel is retarded by heavy inventories, district mill interests anticipate steady improvement through the quarter as present stocks are consumed. During the interim backlogs will supplement current orders in sustaining mill operations at capacity for probably the remainder of this month.

With the recession of the flood affected businesses will probably be back in the market. Current ordering is at a rate of only 80 per cent of mill capacity but operators are expecting steady improvement. Automotive demand is expanding and household appliance manufacturers indicate that an increase in their needs is imminent.

Contracting for pig iron needs is slow, largely as the result of inventories carried over from first quarter. Shipments of iron also are less since melters pressed to complete low price contracts before the turn of the quarter. Price schedules are firm and users show no disposition to seek more favor-

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able rates. Foundry operations are pushing upward slowly and without spectacular feature.

By-product foundry coke prices have been reaffirmed at \$9.80, delivered in Cincinnati, for this quarter, but domestic grades are off \$1.10, the new dealers' quotation being \$5.15, delivered in Cincinnati.

The scrap market is weaker, dealers having cut all bids 25c. Mill interests are indifferent to new orders, reporting sufficient material on hand.



... Many small construction jobs being let.

◦ ◦

... Steel production continues to rise.

BUFFALO, April 7.—The first division of the Buffalo sewage disposal plant program has been rejected by the Buffalo Sewer Authority and the job which formerly called for 150 tons of re-

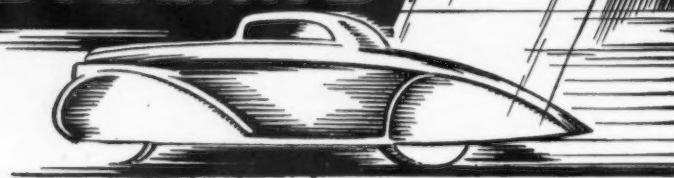
inforcing bars will have to be readvertised. Additional work contemplated may bring the reinforcing tonnage up to 300 or 400.

Both reinforcing bar makers and structural steel fabricators are busy with small jobs. There are a number of 10-ton and 15-ton lots and new schools at Lancaster, Alden, Woodlawn and other places require 60 tons apiece. Makers can keep shops going to near-capacity with small work, but the larger jobs are not going forward in any great number at this time. The J. W. Cowper Co. got the contract for the 100-ton Tonawanda Town Hall, but the steel has not been definitely awarded.

Bethlehem Steel Co. had 18 open-hearth furnaces in operation at the end of the week, and an additional furnace was expected to be put on this week. This will be the heaviest operation in years. Republic Steel Corp. is operating four, with a possibility of five before the end of the week. Wickwire-Spencer company is operating one. Seneca sheet division of Bethlehem is still at 75 per cent.

Pig iron producers had a good March. The consumption of tonnage is more widespread. Many foundries will not contract, preferring to buy for immediate needs, but improved operations are noted in almost every kind of castings manufacture.

CLEVELAND



... Mills still busy on first quarter contracts.

... Ingot production holds at 82 per cent of capacity.

... Iron ore prices reaffirmed at same levels for eighth year.

CLEVELAND, April 7.—Ingot output is unchanged at 82 per cent of capacity in the Cleveland-Lorain district this week. Republic Steel Corp. has put on two additional open-hearth furnaces and is now operating all 14. The Otis Steel Co. took off an open-hearth at its Riverside works.

Most sheet and strip mills are operating close to capacity to get out by April 15 the large amount of steel placed on their books last month when the old price schedules were in effect. The volume of new business in finished steel continues rather heavy. Considerable tonnage in bars, sheets and strip steel is coming from motor car parts makers and the miscellaneous demand is well maintained. New price schedules appear to be firmly adhered to.

While some new business is coming from automobile manufacturers, it has not been in large enough lots to afford a good test of the new prices. Refrigerator manufacturers are increasing production and ordering more steel. Manufacturers wire from bolt and nut manufacturers have taken a spurt. Fence has become fairly active.

The Erie Railroad has placed 18,099 tons of rails. Car inquiries from the Van Sweringen railroads are still pending. Miscellaneous railroad demand has improved.

Lake Superior iron ore prices that prevailed last year have been reestablished by the sale of a substantial tonnage.

Pig Iron

Orders from automobile foundries in Michigan have increased and these helped to sustain the volume of new business which continues good. While April shipments were expected to be lighter than in

March because of the cleaning up of old low-priced contracts during the past month, some producers now predict that they will move more iron this month than in March. Agricultural implement foundries continue very busy but some have acquired good stocks and are not buying iron at present. Demand from jobbing foundries is expanding.

Bars, Plates and Shapes

Demand for bars from the automobile industry and from agricultural implement and road machinery builders continues in good volume. Mill orders for structural shapes have improved, although new inquiry for fabricated work is light. Rebuilding of a Cleveland blast furnace by the Republic Steel Corp. will take 700 tons of plates and shapes. Bids are being taken this week for Ohio highway bridge work, requiring 500 tons. Plates show improved activity. Demand is better from boiler shops, but not active from tank shops.

Reinforcing Bars

To help in stabilizing distributors' prices, producers expect to name open market prices to distributors on new billet steel bars following the plan that has been adopted in quoting on other mill products. However, no official announcement has as yet appeared. Bending extras have been advanced to \$6 a ton for $\frac{1}{2}$ -in. and larger and to \$16 a ton for $\frac{3}{8}$ -in. and smaller. These distributors' extras which prevailed under code regulations are \$2 a ton higher for the former and \$4 a ton higher for the latter than have prevailed recently.

Sheets

New demand in this district is quite brisk, particularly from mak-

ers of automobile stampings. Orders from makers of stoves and washing machine tubs and miscellaneous consumers continue good. Refrigerator manufacturers are increasing production and new business in sizeable lots is coming from that source, although some of the refrigerator makers have put in good stocks and are temporarily out of the market. Not much new business was placed by automobile plants during the week and the new price schedules are yet to be tested on round lot buying. Local mills are operating at full capacity to get out by April 15 orders placed at the recently prevailing prices and some consumers are crowding mills for deliveries.

Strip Steel

A heavy volume of specifications for hot-rolled strip has come from cold-rolling plants and there is a good demand from agricultural implement makers and miscellaneous consumers. One producer is four to six weeks behind on deliveries. New business in hot and cold strip from automobile parts makers is light but considerable strip is being shipped to these plants against old contracts. Local strip mills are operating at capacity.

Bolts, Nuts and Rivets

Bolts and nuts continue to move in heavy volume to the automotive industry. Demand is good from implement manufacturers and orders have improved from miscellaneous users. Many are ordering in larger lots than recently. While larger manufacturers are adhering to regular prices, there are reports of concessions by some of the smaller makers.

Iron Ore

Lake Superior iron ore prices have been reestablished by the open market purchase of a substantial tonnage by one consuming interest, the business having been divided between two leading ore firms. The inquiry from the Ford Motor Co. for 490,000 tons, which was the first to come out and against which last season's prices were quoted, is still pending and the Ford tonnage may not be placed for several days. This will be the eighth season during which the same prices have prevailed.

Reestablished prices for ore delivered lower lake ports, per gross ton, are: Old Range Bessemer, \$4.80; Old Range non-Bessemer and Mesabi Bessemer, \$4.65; Mesabi non-Bessemer, \$4.50 and high phosphorus, \$4.40.



**...Awards of 4700 tons—
10,950 tons in new
projects.**

AWARDS

Medford, Mass., 1500 tons of liner plates, to Concrete Steel Co.

Albany, N. Y., 550 tons, Montgomery Ward & Co., building, to Bethlehem Steel Corp.

Wilmington, Del., 150 tons, duPont office building foundation, to J. & L. Steel Service Co., Long Island City, N. Y.

Philadelphia, 500 tons, billet steel for Philco Radio & Television Corp. building, to an unnamed bidder.

Chicago, 1300 tons, Division P of Sanitary District, to Concrete Steel Co.

State of Wyoming, 109 tons, three bridges in two counties, to unnamed bidders.

Placerville, Cal., 129 tons, high school gymnasium, to Kyle & Co.

Long Beach, Cal., 100 tons, Veterans' memorial building, to an unnamed bidder.

Douglas, Ariz., 143 tons, State undercrossing, to an unnamed bidder.

State of New Mexico, 187 tons, bridges in four counties, to unnamed bidders.

NEW REINFORCING BAR PROJECTS

Washington, 4000 tons, building for Department of Agriculture.

Chicago, 900 tons, Sanitary District work; T. J. Forschner, general contractor.

Chicago, 500 tons, housing project; S. N. Nielsen, general contractor.

State of Illinois, 1000 tons, bridges; bids April 7.

State of Indiana, 1000 tons, bridges.

St. Louis, 200 tons, building for St. Louis Dairy Co.; Fruin-Colnon Contracting Co., general contractors.

San Francisco, 175 tons, roadway between Sausalito and Golden Gate bridge; bids April 15.

San Francisco, 300 tons, shop building at Marina school; bids April 22.

San Francisco, 101 tons, material for Treasury Department under five schedules; bids opened.

Stockton, Cal., 100 tons, ward building at State hospital; bids opened.

Los Angeles, 100 tons, assembly hall at Hamilton high school; bids opened.

Los Angeles, 500 tons, United Parcel Service warehouse and garage; bids soon.

Los Angeles, 100 tons, building at Holy Spirit parochial school; bids soon.

Los Angeles, 200 tons, property building for Century-Fox Film Corp.; bids opened.

Los Angeles, 602 tons, material for Treasury Department under Schedule No. 8035; Truscon Steel Co. low bidder.

San Pedro, Cal., 100 tons, Barton Hill school reconstruction; bids opened.

Pasadena, Cal., 150 tons, Community Play House Association school; general contract awarded.

State of Oregon, 165 tons, bridges and highway work in four counties; bids April 16.

Portland, Ore., 760 tons, State overcrossing on Union Avenue; bids April 16.

**Foundrymen to Meet
May 4 in Detroit**

THE 1936 annual convention of the American Foundrymen's Association will be held in Convention Hall, Detroit, the week of May 4. In connection with the convention, there will be held a foundry and allied industries exposition. All indications point to the exposition being one of the largest ever held. It will present a great number of working exhibits and will show many new developments in foundry equipment and supplies.

A tentative convention program shows a well-balanced schedule of

papers and reports on practical operating and metallurgical problems of all branches of the industry. Of outstanding significance will be the session on progress in the medical, legislative and engineering aspects of safety and hygiene in the foundry. Of equal importance will be a session on apprentice training. These two subjects have considerable current interest.

Heat treatment of cast iron, the effect of alloys, and melting practices will be given the greatest share of attention by the gray iron foundrymen. The non-ferrous foundry sessions will feature papers covering shop practice in the production of special bronzes. The malleable division has been fortunate in securing papers by outstanding authorities covering sands, annealing, and temperature control. General interest papers on refractories and sand research also will be presented. In addition, one meeting has been arranged for a discussion of shop training in engineering schools. Also, three papers from European foundrymen are included in the schedule of sessions.

Technical sessions for the engineer and metallurgist, shop course meetings for the practical production man, and round table luncheon meetings for the informal discussion of representative foundry problems, should provide an extremely busy week for those in attendance.

NOPAK VALVES



An air leak equal to $\frac{1}{16}$ " diameter hole costs \$28.00 per month. Air is expensive, control it efficiently and accurately with a NOPAK valve—a patented leak-proof valve guaranteed to stay tight without maintenance. Its flat, patented disc together with a packless spindle prevents sticking and assures you of many years of leak-proof operation. Permits throttling or quick opening. Easy to operate. Seat protected at all times and cannot wear out. NOPAK valves are suitable for air, gas, water, or oil. Write for Bulletins.

Made in shut-off, three-way and four-way styles $\frac{1}{4}$ " to 2" pipe openings, three and four-way for operating single and double acting cylinders.

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MANUFACTURING COMPANY
2724 S. 31st Street Milwaukee, Wisconsin

ALSO COMPLETE LINE OF BALERS: Electric and Hydraulic, also HYDRAULIC PRESSES and PUMPS



... Awards are lower at 14,850 tons, compared with 17,150 tons a week ago.

○ ○ ○

... New projects call for 26,187 tons, as against 14,440 tons in the previous week.

○ ○ ○

... New plate requirements total 12,400 tons.

NORTH ATLANTIC STATES

Wells, Me., 147 tons, State bridge, to Pittsburgh-Des Moines Steel Co.

Cranston, R. I., 100 tons, city hall, to Providence Steel & Iron Co.

Buskirk, N. Y., 100 tons, Boston & Maine Railroad grade crossing elimination, to Bethlehem Steel Corp.

Nashua, N. H., 515 tons, senior high school, to Groisser & Shlager Iron Co.

Hewlett, N. Y., 145 tons, grade school, to Dreier Structural Steel Co.

Glens Falls, N. Y., 145 tons, Ridge Street school, to James McKinney & Son.

New York, 120 tons, Williamsburgh bridge floor repairs, to Egleston Brothers & Co., Inc.

New York, 1225 tons, International Harvester garage, 560 West Forty-second Street, to an unnamed bidder.

New York, 1350 tons, Girls' Industrial High School in Bronx, to Harris Structural Steel Co.

Brooklyn, 260 tons, Red Hook health center, to an unnamed bidder.

Flushing, N. Y., 390 tons, storage track supports, to Bethlehem Steel Corp.

Spears, Pa., 165 tons, trestle, Crescent Mine No. 2, to Fort Pitt Bridge Works Co.

Collingdale, Pa., 115 tons, school gymnasium, to Norris Iron & Wire Co.

Camden, N. J., 100 tons, building for Samuel Langstown Co., to Morris, Wheeler & Co.

SOUTH AND SOUTHWEST

Charleston, W. Va., 2060 tons, Kanawha River bridge, to Wisconsin Bridge & Iron Co.

Wheeler Dam, Tenn., 1780 tons, 298 transmission towers, to Blaw-Knox Co.

Harris County, Tex., 235 tons, highway bridge work, to Peden Iron & Steel Co.

Medina County, Tex., 180 tons, underpass, to Virginia Bridge Co.

Jim Wells County, Tex., 455 tons, overpass, to Mosher Steel & Machinery Co.

Coweta County, Ga., 160 tons, State highway bridge, to Bethlehem Fabricators, Inc.

CENTRAL STATES

Grant and Lafayette Counties, Wis., 250 tons, bridge, to Wausau Iron Works.

State of Pennsylvania, 850 tons, highway bridges.

Monmouth County, N. J., 600 tons, Shark River bridge; bids April 9.

Philadelphia, 5000 tons, school at Ninth and Mifflin Streets; bids April 22.

Bedford, Cambria and Westmoreland Counties, Pa., 1262 tons, three highway bridges; bids April 17.

Washington, 800 tons, Michigan Avenue bridge for Baltimore & Ohio Railroad.

THE SOUTH

State of Texas, 1650 tons, bridges.

CENTRAL STATES

Cleveland, 700 tons, shapes and plates for rebuilding Republic Steel Corp. blast furnace.

Harrison County, Ohio, 175 tons, two State bridges; bids April 10.

Tuscarawas County, Ohio, 175 tons, State highway bridge; bids taken.

Ashland County, Ohio, 150 tons, State highway bridge; bids taken.

Beach City, Ohio, 180 tons, State highway bridge.

State of Indiana, 1400 tons, bridges.

Dearborn, Mich., 450 tons, recreation building.

State of Illinois, 825 tons, bridges.

State of Minnesota, 575 tons, bridges.

State of Missouri, 2100 tons, bridges.

Ellis County, Kan., 100 tons, highway bridge; bids April 10.

WESTERN STATES

Boulder City, 320 tons, diversion towers and supports for Bureau of Reclamation; International Derrick & Equipment Co. low bidder.

Knob, Cal., 900 tons, bridge across All-American Canal.

San Francisco, 500 tons, tunnels between Sausalito and Golden Gate bridge; bids April 15.

San Francisco, 4000 tons, Matson Navigation Co. freighters; bids May 4.

FABRICATED PLATES

AWARDS

Leetsdale, Pa., 175 tons, two fuel flats, to Dravo Contracting Co.

Pittsburgh, 240 tons, lower gates for Emsworth Dam on Ohio River, to Dravo Contracting Co.

Seattle, 175 tons, tanks for Horluck Brewing Co., to Nelson Boiler & Tank Co.

Portland, Ore., 100 tons, repairs to Government dredges, to Commercial Iron Works.

NEW PROJECTS

St. Paul, Minn., 500 tons, dredge.

Salem, Ore., 5000 tons, 18-mile pipe line for city; vote on bonds expected soon.

Lawes, Cal., 900 tons, 6100 ft. of 86-in. pipe and facing dam for Los Angeles Department of Water and Power; no date for bids.

San Francisco, 6000 tons, Matson Navigation Co. freighters; bids May 4.

SHEET PILING

AWARDS

Denver, 300 tons, for Bureau of Reclamation, to Inland Steel Co.

PHILADELPHIA



... Furnace activity rises one point to 43 per cent.

• • •

... Local mills participate in N. & W. purchases.

• • •

... Second-quarter demands are very light.

PHILADELPHIA, April 7.—Mills are busy rolling against first quarter orders. Although most producers had hoped to close out old low-priced tonnage before the middle of April, it is a generally admitted fact here that shipments against these old orders will run up to the end of the month. Salesmen are currently pressing customers for May-June commitments, but only a few concerns which habitually enter contracts are showing any interest in coverage this far ahead.

The great mass of smaller buyers still have deliveries due them and are generally anxious to liquidate these orders before entering the market for replacements at the new scale of extras. Among buyers, there is little sentiment here either for or against new extra schedules for sheets, strip and wire. The new alignment will have no real test for at least another month at which time buyers should be more active and sellers more in the need of orders to round out rolling schedules.

The absence of steel demand for flood rehabilitation is conspicuous, particularly in view of the general expectation for a spurt in demand from this direction. A moderate quantity of pipe has gone into flood repair work, several hundred tons of standard beams have been sold for bridge repairs, and jobbers in the affected areas have depleted galvanized stocks. Highway bridge reconstruction will be spread over the next year and will merely take the place of what otherwise would have been new construction.

Several district mills have advanced operations fractionally and the eastern Pennsylvania operating rate is one point higher at 43 per cent of potential capacity. No

ingots are being stocked here, indicating that operations should remain quite steady over the next several weeks.

Pig Iron

Viewed as a whole, this market is a listless affair. Several large sellers are enjoying a moderate amount of business from regular customers, but the rank and file of furnace representatives report little or no second quarter demand. There are, of course, some small spot tonnages trickling into the market, but total turnover is considerably under actual day-to-day consumption. Evidently foundries are still liquidating old low-priced stocks and are delaying as long as possible the ordering of replacement tonnages at higher price levels.

Sheets and Strip

Most jobbers are loaded up for April, but will soon have to buy in a modest way for May delivery. Jobber stocking at the low first quarter price levels was on the whole less conspicuous than mills had expected. The two local automobile stamping plants are working on maximum schedules. Their requirements are well covered through April and into May at shaded price levels. When these tonnages are liquidated, their activities will probably be beginning to taper. Nevertheless it should be necessary for them to come into the market for fair tonnages over the next 20 days. Demands from tank and boiler shops have improved slightly. Mill backlog on blue-annealed and plain galvanized sheets are none too impressive, however, and delivery within two weeks is the rule rather than the exception.

Bars, Plates and Shapes

Estimators are figuring on much less construction tonnage than they had expected to be doing by this time. Private inquiries are conspicuously absent, and State highway and bridge projects are suffering one delay after another. Pennsylvania Railroad continues to specify on its carbuilding program, and Sun Shipbuilding Co. has taken several fairly heavy deliveries during the week. Two awards totaling 215 tons constituted the week's activity in shapes. New projects include 5000 tons for a Philadelphia school, 1275 tons for three Pennsylvania highway bridges, and 600 tons for a Shark River, N. J., bridge. Reinforcing steel awards during the week aggregated 650 tons, but no new business of any consequence has come up for bidding. Practically every district mill shared in 5100 tons of carbon steel plates, shapes and bars placed last week by the Norfolk & Western Railroad. Bethlehem secured 900 tons, Jones & Laughlin was awarded 300 tons and 300 tons went to Gulf States Steel Co. Lukens, Central, Republic, Alan Wood, Phoenix, and Youngstown also participated in the awards. This railroad still has 2500 tons of high-tensile, low alloy steel to buy.



... Pig iron demand improves slightly.

• •

... Recovery from flood progressing.

BOSTON, April 7.—One Fitchburg foundry is still out on account of recent floods, but most other Massachusetts, New Hampshire, Vermont and Maine plants are either operating or about to start. Losses of patterns and flasks by flood were remarkably small.

Sentiment among foundry operators naturally is more optimistic, and demand for pig iron is a little better as a result. Sales the past week approximated 2200 tons, very largely for second quarter shipment. Spot demand is almost exclusively for truck lots.

Michigan Tool Co. Again Extends Its Manufacturing Facilities at Detroit

FOR the second time in five years, Michigan Tool Co., Detroit, has expanded its manufacturing facilities in line with increasing business and a broadening of the company's products. The present expansion, in the form of a 20,000 sq. ft. wing, adjacent to the main plant, has been completely equipped and toolled for the production and assembly of special machinery.

During the past few years, Michigan Tool has become a leading designer and producer of gear production and checking equipment and has built up one of the most extensive production and engineering design staffs in the machine tool industry.

Production equipment in the new wing is of the latest type, enabling rapid and accurate production of machine tool equipment, etc., complete from the snagging of the rough castings to the spray booth painting and sludging of the finished product.

Included in the new equipment is what is believed to be the largest

planer at present in the Detroit area. This planer is capable of machining the ways of six Michigan gear finishers at one set-up, with the bases mounted three in a row and two abreast on the planer table. In the normal production of equipment, machine bases are routed to this planer direct from the filling and priming room.

From the planer, bases and other parts of the equipment are transferred to one or more of a group of horizontal boring, drilling, and milling machines. The largest of these is a single-spindle model 50 G & L boring machine, while the others are of the double-spindle type. There is also a new Carlton 6-ft. radial drill in the group.

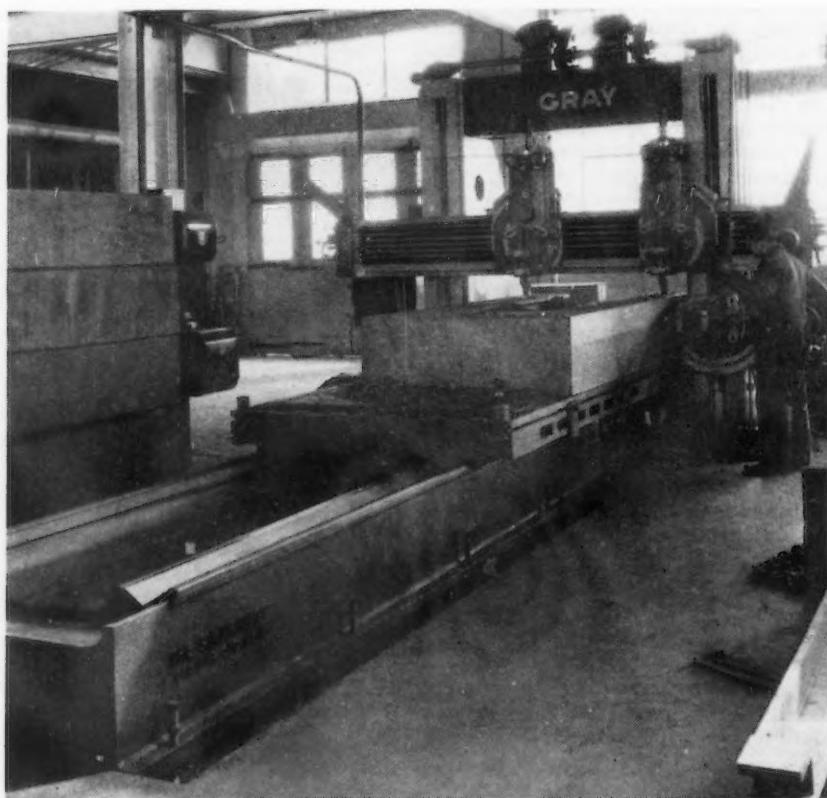
To the rear of the larger equipment, which is arranged along a wide central aisle, are a large variety of smaller machines including drill presses, lathes and shapers. On these, smaller machine tool parts are produced. Some parts are turned out in the

former main plant of the factory and transferred directly from there to the assembly "line."

Assembly of machine tools is carried on progressively from almost one end of the new wing to the other. The job of transferring the bulky equipment in process from place to place is made rather simple by the arrangement of heavy machining equipment alongside of the central aisle, which is served by a giant traveling crane, capable of handling the heaviest of equipment produced at the Michigan Tool plant.

After final assembly and before shipment, every machine is set up with its individual motors, run in, and tested at the end of the assembly floor. Painting and sludging for shipment is performed in a special ventilated room provided for that purpose. Shipping and receiving are both handled through one set of doors at the far end of the wing, opening up on the central aisle so that if desired, a truck could be run directly into the factory and to the far end of the production line.

While most of the larger equipment used to produce special machinery at the Michigan Tool plant has been obtained from other manufacturers, all of the tooling of these machines has been specially developed by Michigan Tool Co. and its subsidiary, the Tungsten Carbide Tool Co. In the main plant, the company continues to manufacture a wide variety of tools, milling machine cutters, hobs and gear shapers.



THIS planer in the new Michigan Tool plant is believed to be the largest in the Detroit area. It is shown here machining one of a group of bases for some special manufacturing equipment. A number of unfinished bases are shown alongside of the machine.

According to commercial reports from Austria, there is believed to be room for a further expansion of American iron and steel sales in that country. Evidence of the willingness of Austrian buyers to use American steel products may be seen in the fact that only 336 tons were imported in 1934 from America, whereas in 1935, 2836 tons were sold for more than \$150,000. Particular items which have reflected the increase are scrap iron and steel, dressed plates and sheets, saw blades, crowbars and tongs, files, rasps, drills, screws, bolts, chains, steel furniture, knives and scissors.

Rubber Service Laboratories Co., Akron, Ohio, will carry on its operations in the future under the name of Monsanto Chemical Co., Rubber Service Laboratories Division, Second National Building, Akron.

Electrochemists to Meet at Cincinnati

THE sixty-ninth convention of the Electrochemical Society will be held at the Netherland Plaza Hotel, Cincinnati, April 22 to 25, inclusive. Over 40 important contributions are to be presented and Thursday and Friday afternoons will be devoted to factory visits.

"Electricity in Gases" is the topic of the Joseph W. Richards Memorial lecture to be delivered on Thursday evening, April 23, by Dr. Karl K. Darrow, famed physicist of the Bell Telephone Laboratories.

The annual banquet is scheduled for Friday evening, at which James H. Critchett, president of the society, will discuss the metallurgy of columbium in stainless steels. Dr. Leo H. Baekeland of velox and bakelite fame, will be formally elected to honorary membership in the Society, a signal distinction which only three others hold. The prize to young authors this year goes to U. B. Thomas, of the Bell Telephone Laboratories, for his outstanding improvements in storage battery performance.

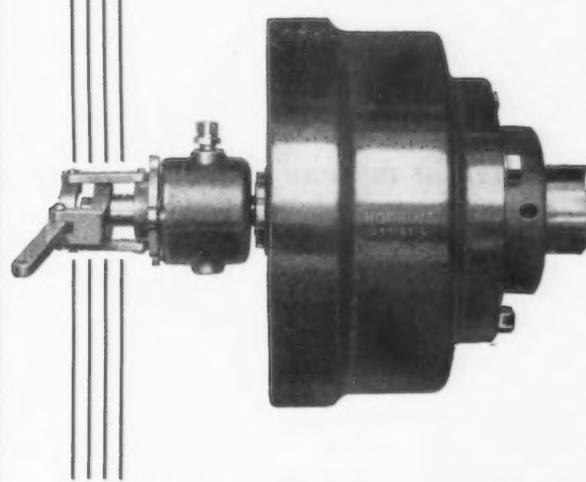
Prof. J. C. Warner of the Carnegie Institute of Technology, Pittsburgh, will preside at the opening session on the morning of April 23. The topic of discussion will be inhibitors: inhibitors added to acids to clean steel and prevent pits and perforations, inhibitors to retard rusting, and inhibitors in rubber, paints and gasoline.

Dr. R. L. Seabury of the General Motors Corp. will be in charge of the session Friday morning, April 24, at which batteries, dry cells and organic chemicals will be discussed. Jean Billiter, of Austria, will describe his electrochemical method of converting the water of Lake Michigan into pure drinking water and into water equal in quality to distilled water.

Saturday morning will be devoted to "electronics" and will be in charge of Dr. J. W. Marden, assistant director of the Westinghouse Lamp Co. Dr. M. Pirani, of the Osram Tungsten Lamp factory, Berlin, will discuss the behavior of gases during electric discharge. Joseph Slepian, of the Westinghouse company, will describe his new mercury arc power rectifier, a radical departure in design and steady performance. A. C. Hanson, of Washington, will show how X-rays pass through concrete walls.

The closing session, Saturday afternoon, will be conducted by W. W. McCord of the McCord

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JACKSON, MICHIGAN

Radiator Co., Detroit. A dozen papers will be presented: How to plate manganese on brass and steel; plating of aluminum alloys, alloys of cobalt and nickel, and alloys of thallium and zinc. Prof. B. S. Hopkins, of Illinois, will discuss Ytterbium; Prof. Edgar Newbery, of South Africa, has a paper on mercury perchlorate solutions; and there will be papers on antimony, copper, nickel, and others.

New Handbook for Estimators

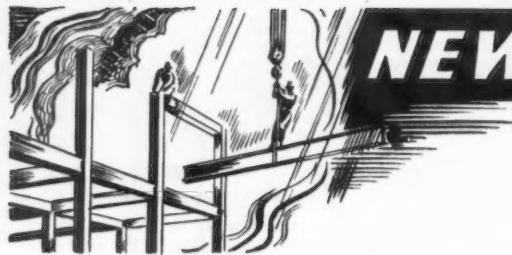
AN estimator's handbook with tables giving material required per 1000 pieces for either round, square, hexagon or flat stock of any material or dimension, and the production cost per 1000 pieces, providing the time element per unit produced is at hand, is being published by the New-Method Engineering Corp., 4761 Broadway, Chicago.

The book is designed to save time-consuming calculations in estimating, production, time study, cost, inventory and other departments. It comprises 1104 pages, $7\frac{3}{8} \times 10\frac{1}{2}$ in., and is divided into nine numbered sections. Sections 1 to 4 are devoted to steel stock required per 1000 pieces. Subdivisions in each of these sections,

as well as in sections 6 to 9, devoted to brass stock, include instructions, table for conversion to other materials, table of diameters, sizes or thickness, given in the respective section, and table of weights and number of lineal feet required. Section 5 covers production cost and time required per 1000 pieces, and includes data on net production—per hour at various rates of efficiency; and production time for each piece—in split seconds and their equivalent in decimal parts of a minute or hour. Subdivisions in this section include a table of units of time and conversion; hourly production; hours required per 1000; and tables of cost at rates of \$0.55 to \$2.00 per hour, with production time of each piece from $6/10$ sec. to 1 hr. at efficiency rates from 50 to 150 per cent.

In addition to simple and convenient arrangement of the data, a paramount consideration of the authors, Louis E. Almgren and Michael Wurum, was completeness. The introductory price of this first edition of the New-Method Estimators' Handbook is \$12.50.

W. N. Best Engineering Co., and associated companies, has leased new quarters at 242-256 South Parkway, Passaic, N. J. Plant area is approximately 17,000 sq. ft., 8000 of which is in buildings, with railroad sidings. Company plans to move equipment in May from Walden, N. Y., to Passaic.



NEW YORK

... New orders in lighter volume as second quarter gets under way.

• • •

... Shipments against old contracts still heavy.

• • •

... Railroad releases rise sharply.

NEW YORK, April 7.—While new orders for finished steel are somewhat lighter in this area, shipments against old contracts continue rather heavy. This is particularly true in the case of sheets and strip steel, new demand for which is negligible.

Railroad buying is not active in this territory, but releases are much heavier. The New Haven has placed 50 passenger coaches with the Pullman-Standard Car Mfg. Co., to be built at Worcester, Mass., but is reported to have not yet received the Court's permission to buy 10 locomotives. It will not likely buy freight cars in the near future. Practically all the carriers which have rails on order are now taking out tonnage and accessories are likewise being moved in large volume. Some mills are booked at capacity throughout the current quarter on tie plates.

New construction jobs are not coming out so rapidly, particularly projects of large size. P. T. Cox Contracting Co., New York, is low bidder on the section of the New York Central elevated highway from Ninety-second to Ninety-eighth Street, Manhattan, but the 1800 tons of structural steel required has not been allocated. A nurse's home on Welfare Island will take 2000 tons of shapes, an industrial home for girls in the Bronx, 1400 tons, and a ventilating building at Weehawken, N. J., for the Midtown Tunnel will require 1000 tons. Early inquiries are expected on additional sections of the West Side elevated highway, the completion of which will take 25,000 to 30,000 tons of steel.

Snead & Co., Jersey City, who are low bidders on the shelving for the addition to the Congressional Library, Washington, will probably be awarded this contract during the week. About 6000 tons of sheets and strip steel will be required.

Steel prices are being well main-

tained, although no adequate test of second quarter quotations have been offered.

Pig Iron

Small-lot orders were moderately better last week, but no further inquiry for exceptional tonnages has come out. Shipments on contract are expanding, as foundry and foundry customers renew operations temporarily impeded by flood

waters. Certain Connecticut and other New England foundries which suffered severe flood damage are possibly not likely to rebuild, though this contingency rests largely upon the size and financial status of the establishments affected. Here and there, however, it is probable that a few small independents will be weeded out. Operations among Brooklyn firms continue spotty. The largest jobbing foundry is currently active five days a week, and reports business on the up-grade. Neighboring firms are intermittently busy. In the absence of renewed attempts by concession-minded buyers to bargain against placement of heavy contracts, pig iron prices are reported firm from all angles.

Reinforcing Steel

A definite lull in business is reported by sellers of reinforcing steel this week. The few awards made have been small. A building for Montgomery Ward & Co. in Albany required 550 tons which was supplied by the Bethlehem Steel Corp. Prices are better than they have been for some time and prospects for future work are bright.

PIPE LINES

Continental Oil Co., Ponca City, Okla., plans early construction of new welded steel pipe line from Laurel Creek, Wyo., oil field district to Manville, Wyo., about 20 miles, for crude oil transmission. Cost close to \$50,000. Executive offices are at 60 East Forty-second Street, New York.

Northern Oklahoma Gas Co., Newkirk, Okla., Joseph Boyd, manager, recently organized, will take over properties of Ponca City Gas Distributing Co., Ponca City, Okla., Kansas-Osage Gas Co., Kay County Gas Co., and natural gas properties of Continental Oil Co., Ponca City, and is considering construction of welded steel pipe lines for connection between different properties. Company will furnish natural gas at Ponca City, Newkirk, Kildare and other neighboring communities.

S

Nickerson, Kan., plans steel pipe line system for natural gas distribution. Election has been called to approve bonds for \$29,500 for project.

Bureau of Reclamation, Denver, asks bids until April 21 for miscellaneous fabricated steel pipe and fittings for Boulder power plant, Boulder Canyon Project (Specifications 786-D).

San Diego, Cal., plans about two miles of steel pipe for connection between El Capitan steel pipe line for main water supply and Murray reservoir. Fred D. Pyle is city hydraulic engineer.

Prairie Gas & Utilities Syndicate, Ltd., Regina, Sask., G. C. Rooke, president,

will soon take bids for new welded steel pipe line from natural gas field in northern Montana to Regina and other points in Saskatchewan Province for gas transmission to number of municipalities, about 200 miles. Cost over \$2,000,000. Herbert R. Davis, Liberty Bank Building, Buffalo, is consulting engineer.

RAILROAD BUYING

Waukesha Motor Co. has received orders for air conditioning equipment from St. Louis-San Francisco, Southern Pacific and Texas & Pacific railroads.

American Car & Foundry Motors Co. has received following orders for H-17-S motor coaches: Two from Conestoga Co., five from Boston Elevated Railway and five from Staten Island Coach Co.

Electro-Motive Corp., La Grange, Ill., has placed order with Timken Roller Bearing Co., Canton, Ohio, for bearings and journal boxes to equip all axles of four high-speed 1800-hp. and two 1200-hp. diesel electric locomotives for Chicago, Burlington & Quincy Railroad.

Chicago, Milwaukee, St. Paul & Pacific Railroad has been authorized to issue \$3,840,000 of equipment trust certificates to the Reconstruction Finance Corp. by the Interstate Commerce Commission, in connection with acquisition of equipment reported in the Feb. 27 issue.

RAILS

Chicago, Rock Island & Pacific has ordered 26,000 tons.

Erie placed 14,099 tons with Carnegie-Illinois Steel Corp., 2462 tons with Bethlehem Steel Corp., and 1538 tons with Inland Steel Co.

Denver & Rio Grande Western has ordered 10,000 tons from Colorado Fuel & Iron Co.

Steel Exports and Imports Lower in February

Exports (In Gross Tons)

	February		Two Months Ended February	
	1936	1935	1936	1935
Pig iron	51	284	237	545
Ferromanganese and speigleisen	1	...	8	3
Other ferroalloys	146	420	...	...
Iron and steel scrap	142,165	151,720	296,071	331,350
Tin plate scrap	1,313	2,894	3,774	7,103
Waste-waste tin plate	1,524	1,718	4,119	3,991
Pig iron, ferroalloys and scrap	145,200	156,616	304,629	342,992
Ingots, blooms, billets, sheet bars	314	5,330	409	8,551
Skelp	1,525	1,171	2,337	1,544
Wire rods	1,786	1,681	5,725	4,960
Semi-finished steel	3,625	8,182	8,471	15,055
Bars, concrete reinforcement	57	...	307	...
Bars, other steel	4,711	5,407	7,864	10,306
Iron bars	6	34	124	267
Plates, iron and steel	5,241	4,011	8,775	6,030
Sheets, galvanized steel	3,404	6,178	9,699	11,502
Sheets, galvanized iron	98	56	228	155
Sheets, black steel	9,306	6,953	18,122	19,119
Sheets, black iron	635	468	1,251	869
Hoops, bands, strip steel	4,367	3,512	9,321	6,284
Tin plate and taggers' tin	12,866	10,266	30,891	25,220
Terne plate (including long ternes)	203	266	636	548
Structural shapes, plain material	3,880	2,210	7,228	3,873
Structural material, fabricated	685	2,126	1,847	3,837
Sheet piling	129	...	414	...
Tanks, steel	2,276	501	4,356	1,275
Steel rails	4,108	1,189	8,438	2,189
Rail fastenings, switches, spikes, etc.	675	694	1,567	1,409
Boiler tubes	345	320	804	1,152
Casing and oil line pipe	1,194	5,037	3,678	9,095
Pipe, black and galvanized, welded steel	1,343	3,135	4,633	7,330
Pipe, black and galvanized, welded iron	109	328	496	472
Plain wire	1,922	1,892	6,952	5,112
Barbed wire and woven wire fencing	2,554	2,313	4,298	5,037
Wire cloth and screening	74	74	148	174
Wire rope	183	319	592	550
Wire nails	674	548	1,349	1,331
Other nails and tacks	235	305	477	654
Other wire and manufactures	488	306	853	671
Bolts, nuts, rivets and washers, except track	448	574	909	1,012
Other finished steel	106	125	319	197
Rolled and finished steel	62,322	59,147	136,576	125,670
Cast iron pipe and fittings	688	2,375	1,473	3,193
Malleable iron screwed fittings	181	184	408	453
Carwheels and axles	366	695	651	1,184
Iron castings	913	564	1,759	1,413
Steel castings	209	231	419	347
Forgings	232	543	914	970
Castings and forgings	2,589	4,592	5,624	7,560
Total	213,736	228,537	455,300	491,277

Imports (In Gross Tons)

	February		Two Months Ended February	
	1936	1935	1936	1935
Pig iron	14,660	10,741	29,693	12,774
Sponge iron	463	...	771	257
Ferromanganese ¹	908	2,749	3,156	5,379
Spiegeleisen	1,425	...	3,465	...
Ferrochrome ²	1	...	1	...
Ferrosilicon ³	41	88	137	212
Other ferroalloys ⁴	7,562	2,790	15,276	5,205
Scrap	28,060	16,368	52,499	23,828
Pig iron, ferroalloys and scrap	28,060	16,368	52,499	23,828
Steel ingots, blooms, etc.	112	467	...	566
Billets, whether solid or hollow ⁵	55	...	123	...
Wire rods	2,192	952	4,166	1,727
Semi-finished steel	2,247	1,419	4,289	2,293
Concrete reinforcement bars	107	...	238	109
Hollow steel bars	130	55	335	105
Merchant steel bars	2,525	1,604	5,580	3,814
Iron slabs	164	119	311	177
Iron bars	2	19	52	29
Boiler and other plate	1,660	546	3,756	867
Sheets, skelp and saw plate	1,660	546	3,756	867
Die blocks or blanks, etc. ⁶	1	...	5	...
Tin plate	10	10	14	14
Structural shapes	3,112	1,885	7,791	5,454
Sheet piling	20	...	527	...
Rails and track material	255	407	517	618
Welded pipe	323	132	685	153
Other pipe	783	1,247	2,879	2,916
Hoops and bands for baling . . . . .	...	12	...	92
Other hoops and bands	1,278	1,234	3,177	3,441
Barbed wire	1,885	2,217	4,122	3,901
Round iron and steel wire	425	224	872	639
Telegraph and telephone wire	1	...	1	...
Flat wire and strip steel	234	103	466	215
Wire rope and strand	173	113	358	306
Other wire	164	67	273	213
Nails, tacks and staples	2,611	966	4,788	1,959
Bolts, nuts and rivets	70	22	88	58
Horse and mule shoes	28	42	42	124
Rolled and finished steel	15,961	11,024	36,877	25,203
Malleable iron pipe fittings . . . . .	...	...	4	37
Cast iron pipe and fittings . . . . .	...	...	...	...
Castings and forgings	90	94	178	238
Total	43,358	28,905	93,847	51,600

¹ Manganese Content. ² Chrome Content. ³ Silicon Content. ⁴ Alloy Content. ⁵ New Class. No comparable figures for previous year.

FEBRUARY exports of semi-finished and finished iron and steel products from the United States, recorded declines of 16.7 per cent and 4.7 per cent respectively, when compared with the totals for the previous month and the corresponding one of 1935. Notwithstanding the February decline, shipments during the first two months of 1936 were slightly higher than in the January-February, 1935, period.

The export trade in the first two months of the year as compared with 1935 was featured by healthy gains in shipments to Turkey, "Other Asia," Portugal, Uruguay, Mozambique, the Union of South Africa, British Malaya, China, Sweden, the Netherland West Indies, and the United Kingdom. The trade with Japan fell off heavily (63 per cent), while reduced tonnages also went to Soviet Russia, Mexico, Venezuela, Hong Kong, and the Philippine Islands.

Scrap shipments aggregated 145,002 tons, representing decreases of 8.7 per cent and 7.2 per cent respectively, when compared with the total reached in the previous month and in February, 1935.

February Imports of Iron and Manganese Ores

	(In Gross Tons)			
	Iron Ore		Manganese Concentrates, 35 Per Cent or Over	
	1936	1935	1936	1935
Canada	151	...	...	...
Cuba	24,000	22,500	...	2,115
Chile	86,425	43,100	...	125
Spain . . . . .	...	...	...	...
Norway	13,868	6,962	...	...
Sweden	6,842	...	...	...
French Africa . . . . .	...	...	...	...
Russia . . . . .	...	...	12,454	10,749
India . . . . .	...	...	...	118
Brazil . . . . .	...	...	10,975	...
West Africa . . . . .	...	...	5,415	2,878
Other Countries	380	15,783	774	...
Total	124,824	95,187	29,618	15,985

February Imports of Pig Iron by Countries of Origin

	(In Gross Tons)			
	February		Two Months Ended February	
	1936	1935	1936	1935
United Kingdom	150	...	1,082	50
British India	5,058	2,745	8,689	2,745
Germany	868	...	2,476	...
Netherlands	7,981	6,759	12,492	6,759
Canada	358	892	358	1,821
France . . . . .	...	...	...	...
Belgium . . . . .	...	...	529	...
Norway	245	345	347	345
Sweden . . . . .	...	...	200	...
Russia . . . . .	...	...	3,720	...
All others . . . . .	...	...	854	...
Total	14,660	10,741	29,693	12,774



NON FERROUS

... Domestic copper sales are more brisk.

• • •

... Zinc stocks increase 4324 tons during March.

• • •

... Lead moderately active, but tin is dull.

NEW YORK, April 7.—Business in copper has gotten off to a good start this month, with total sales through yesterday up to 13,177 tons. Since yesterday's figure was 6595 tons, this would indicate that trading has grown brisk coincident with this week's opening. Whether the explanation for this occurrence should be looked for in consumer apprehensions that a higher price is pending, as one important seller hinted, or whether it is due to first-of-the-month normal purchases by a few large users, is hard to determine. At present no change in prices can be pointed to. One faction continues to ask 9.50c. a lb., but 9.25c. remains the quotation at which all business has been transacted. A final check on March sales revealed a total of 35,948 tons, as against approximately twice that tonnage in February. During the earlier month, however, action of two large producers in raising quotations to 9.50c. stimulated abnormal precautionary buying. The European copper price has maintained its firmness for quite some time. At present, electrolytic is quoted at the equivalent of 9.05c. to 9.07½c. a lb.

Lead

Business in the domestic lead market proved more active last week, and sales, as reported by a reliable source, were approximately three times the volume of the preceding week. This would roughly indicate that they were between 10,000 and 12,000 tons, contrasted with actual sales of 4000 tons a week earlier. Conflicting views of the tonnage actually booked, however, would seem to indicate that this estimate is a bit high. Opening of the current week revealed a less promising rate of inquiry. One important seller described conditions as hardly satisfactory, but

in another direction there was considerable optimism. Prospects for May buying are conceded to be encouraging by all hands, as April requirements claimed the bulk of

last week's commitments and the forward month still remains to be covered. The price for lead is firm at 4.60c. a lb.

Tin

The domestic tin market remained inactive last week. As in the preceding period, buyers showed little or no interest in the metal, and sales were so sparing as to have made practically no impression upon sellers. Tin plate mill operations, at 75 per cent of capacity, lacked influence. Lower quotations as the current week opened aroused some curiosity, but as yet the inquiry noticed has not materialized into any appreciable business. New York dealers and importers are quoting 47.25c. a lb. on spot Straits tin today. March statistics, revealing a smaller increase in the world's visible supply than anticipated, caused foreign prices to move higher. Standard spot sold in London this morning at £212 10s., while futures were

The Week's Prices. Cents Per Pound for Early Delivery

	April 1	April 2	April 3	April 4	April 6	April 7
Electrolytic copper, Conn.*	9.25	9.25	9.25	9.25	9.25	9.25
Lake copper, N. Y.	9.37½	9.37½	9.37½	9.37½	9.37½	9.37½
Straits tin, Spot, New York	47.55	47.72½	47.60	47.60	47.50	47.25
Zinc, East St. Louis	4.90	4.90	4.90	4.90	4.90	4.90
Zinc, New York†	5.27½	5.27½	5.27½	5.27½	5.27½	5.27½
Lead, St. Louis	4.45	4.45	4.45	4.45	4.45	4.45
Lead, New York	4.60	4.60	4.60	4.60	4.60	4.60

*Delivered Connecticut Valley; price ¼c. lower delivered in New York.

†Includes emergency freight charge.

Aluminum, virgin 99 per cent plus, 19.00c.-21.00c. a lb., delivered.

Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.

Antimony, Asiatic, 13.50c. a lb., New York.

Quicksilver, \$77.00 to \$79.00 per flask.

Brass ingots, commercial 85-5-5-5, 9.25c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	48.25c. to 49.25c.
Tin, bar	50.25c. to 51.25c.
Copper, Lake	10.25c. to 11.25c.
Copper, electrolytic	10.25c. to 11.25c.
Copper, castings	10.00c. to 11.00c.
*Copper sheets, hot-rolled	16.50c.
*High brass sheets	14.62½c.
*Seamless brass tubes	16.87½c.
*Seamless copper tubes	17.00c.
*Brass rods	13.12½c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	5.10c. to 6.10c.
Lead, bar	6.10c. to 7.10c.
Lead, Sheets, cut	8.25c.
Antimony, Asiatic	14.00c. to 15.00c.
Alum., virgin, 99 per cent, pus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.50c. to 20.00c.
Solder, ½ and ¾	29.50c. to 30.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	51.37½c.
Tin, bar	53.37½c.

Copper, Lake.....10.25c. to 10.50c.

Copper, electrolytic.....10.25c. to 10.50c.

Copper, castings.....10.00c. to 10.25c.

Zinc, slabs.....6.50c. to 6.75c.

Lead, American pig.....5.20c. to 6.50c.

Lead, bar.....8.50c.

Antimony, Asiatic.....16.50c.

Babbitt metal, medium grade.....19.00c.

Babbitt metal, high grade.....55.37½c.

Solder, ½ and ¾.....27.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.25c. 8.00c.
Copper, hvy. and wire	7.12½c. 7.62½c.
Copper, light and bottoms	6.12½c. 6.62½c.
Brass, heavy	4.00c. 4.62½c.
Brass, light	3.25c. 4.00c.
Hvy. machine composition	6.00c. 6.50c.
No. 1 yel. brass turnings	5.12½c. 5.62½c.
No. 1 red brass or	3.50c. 3.87½c.
Lead, heavy	5.62½c. 6.12½c.
Lead, heavy	3.50c. 3.87½c.
Sheet aluminum	13.25c. 14.75c.
Zinc	2.50c. 2.87½c.
Cast aluminum	12.12½c. 13.25c.

£205. The Eastern price was £210 5s.

World visible supplies of tin, including the Eastern and Arnhem Catch—Add Non-Ferrous Market—carry-over, totaled 18,663 tons on March 31, or 1101 tons more than a month earlier. United States deliveries were 5520 tons, a reduction of 80 tons from the February figure. World deliveries increased 330 tons to 9811 tons in March.

Zinc

Prime Western sales last week amounted to 1432 tons in the domestic market, and shipments came to 4818 tons. Forward sales accordingly declined 3386 tons to 43,706 tons at the week's close. The price remains firm at 4.90c. a lb. In all other aspects the market is unchanged. Domestic shipments of zinc, as reported by the American Zinc Institute, decreased 1759 tons to 38,159 tons in March. Production increased 6255 tons to 42,483 tons, and stocks accordingly rose 4324 tons to 79,841 tons at the month's close.

Non-Ferrous Averages

The average prices for the major non-ferrous metals for March, based on daily quotations in THE IRON AGE, are as follows:

	Average
Electrolytic copper, Conn.†...	9.250c. a lb.
Lake copper, Eastern delivery	9.375c. a lb.
Straits tin, spot, N. Y.	47.997c. a lb.
Zinc, East St. Louis.....	4.900c. a lb.
Zinc, New York.....	5.275c. a lb.
Lead, St. Louis.....	4.450c. a lb.
Lead, New York.....	4.600c. a lb.

†Price 1/4c. lower in New York.

TRADE NOTES

Rhenisch, Wilson & Waterman, engineers and architects, 612 North Grove Avenue, Oak Park, Ill., will be pleased to receive catalogs from all firms interested in the architectural, engineering and construction industries.

Patron Millwright & Transmission Co. has moved to 154 to 156 Grand Street, New York, where it will occupy the first three floors.

Van Auken-Ragland, Inc., advertising agency, will move May 1 to larger quarters at 20 North Wacker Drive, Chicago.

Noland Co., Inc., Washington, has been appointed Toncan iron sheet distributor for Republic Steel Corp., Cleveland.

National Machine Tool Builders Association has moved to 10525 Carnegie Avenue, Cleveland. New telephone number is Garfield 8270.

Foote Brothers Gear & Machine Corp. has appointed H. S. Thayer, 136 Milnor Avenue, Syracuse, N. Y., as representative in central and northeastern New York.

American Sheet & Tin Plate Is Consolidated with Carnegie-Illinois

In continuation of the policy referred to in its annual report of more closely correlating the activities of the subsidiary companies, directors of the United States Steel Corp. have approved the merging of the properties and operations of the American Sheet & Tin Plate Co. with the Carnegie-Illinois Steel Corp.

The plan contemplates that the properties and the entire activities of the American Sheet & Tin Plate Co. be combined as an integral part of and under the management of Carnegie-Illinois cor-

poration of which Benjamin F. Fairless is president.

The Sheet & Tin Plate company operates open-hearth furnaces at Vandergrift, Pa., with an annual capacity of 360,000 tons of steel ingots. Otherwise, its activities are confined entirely to the production of finished sheets and tin plate, for which Carnegie-Illinois furnishes the raw steel. The company operates 18½ per cent of the country's capacity for making sheets and 35½ per cent of its tin plate and black plate facilities.

Figures Indicate a Bright Rail Outlook

TOTAL rail production in 1935 slumped off 300,000 tons from the 1934 figure but was nearly twice as large as in either 1932 or 1933, according to figures published by the American Iron and Steel Institute. Last year 711,537 tons of rails was produced by all processes combined whereas in 1934 1,010,224 tons was rolled. The depression years, 1932 and 1933, were the smallest rail producing periods for many years, with only 402,566 tons and 416,296 tons having been rolled respectively. The peak year was 1926 when a production of 3,217,649 tons was recorded, exceeding 1929 by nearly 500,000 tons.

Figures reported so far in 1936 indicate that this year may at least equal 1931, when 1,157,751 tons was rolled, since in the first quarter alone 459,191 tons of rails was ordered. The entire production of either 1932 or 1933 has already been surpassed by orders in the first three months of 1936, and if, as is expected, railroad buying continues at the present rate, the 1931 total will be exceeded by a good margin.

Doehler Die Casting Co., Toledo, Ohio, reports for 1935 net profit at \$623,817, or \$2.39 a share of capital stock, compared with \$1.95 a share in 1934. The better earnings were attributed to increased sales, due partly to the company's entry into the field of larger and heavier castings.

PRODUCTION OF RAILS BY PROCESSES IN 1925

Years	Open-Hearth			Included in Total		
	Rolled from Ingots	Rolled from New Sec- onds, etc.	Bessemer	Rolled from Old Rails	Total	Girder and High Tee Alloy
1920..	2,313,750	21,472	143,196	126,698	2,604,116	100,910 12,909
1921..	2,019,988	7,227	55,564	96,039	2,178,818	89,162 6,276
1922..	2,032,004	996	22,317	116,459	2,171,776	128,878 3,163
1923..	2,721,578	17,201	25,995	139,742	2,904,516	130,056 2,142
1924..	2,295,755	11,778	16,069	109,730	2,432,332	85,533 5,167
1925..	2,678,536	13,287	9,687	83,747	2,785,257	98,620 4,009
1926..	3,098,776	9,216	12,533	97,124	3,217,649	116,374 4,216
1927..	2,712,287	5,578	1,566	87,055	2,806,486	99,621 1,265
1928..	2,573,608	6,533	3,156	64,196	2,647,493	113,150 6,453
1929..	2,651,397	10,766	4,209	55,766	2,722,138	109,678 1,965
1930..	1,829,143	5,790	2,182	36,118	1,873,233	69,814 4,687
1931..	1,132,433	3,118	828	21,372	1,157,751	44,652 533
1932..	390,816	2,198	64	9,488	402,566	29,003 565
1933..	388,240	9,372	300	18,204	416,296	17,561 437
1934..	970,428	11,645	2,032	26,119	1,010,224	29,988 1,598
1935..	684,661	7,004	565	19,307	711,537	25,940 520

IRON AND STEEL SCRAP

... Scrap composite drops 17c. to \$14.58, as compared with an average of \$11.83 for 1935 and \$16.30 for 1929.

... Pittsburgh consumer buys 16,000 tons at \$16.

... Prices are down at Chicago and Cincinnati, but are steady at Pittsburgh and strong along Eastern Seaboard.

APRIL 7.—Scrap markets all over the country are tending to achieve stability following the wildly bullish sentiment of a month ago which was occasioned by expanding mill operations and concomitant restriction in supplies due to inclement weather. Dealer offerings are more liberal in most districts, and prices have either steadied at quoted levels or are showing signs of falling off fractionally. Brisk export demands are supporting quotations firmly along the Atlantic Coast. Foreign deliveries are in heavy volume, and brokers still have sizable commitments on their books.

Pittsburgh

The week's market feature at Pittsburgh was a purchase of approximately 16,000 tons of No. 1 heavy melting steel at \$16 by a leading consumer. Scrap is not moving into this district freely as it is being diverted before reaching this point by better prices elsewhere. The tonnage that has moved in is being delivered to consumers who bought at \$16 some weeks ago. This situation may make it necessary for dealers to reduce yard stocks in order to fill the above mentioned order. The next two weeks or so will probably indicate more clearly the direction of the present price of heavy melting scrap. One large local consumer is temporarily out of the market.

Chicago

There currently is somewhat of a panic among dealers. Brokers' desire for a fluctuating market is bringing prices to a lower level. There is still a flood of scrap coming into Chicago, but it is too soon to determine whether earlier appraisals of available tonnages have been in error or whether the present movement is a flash that will not last long. Most of the tonnage now available is coming from the country

and some from a considerable distance, all of which gives the appearance of quick releases that come as a result of a hard winter which delayed the gathering and preparation of much scrap. Railroad offerings have been heavy, a natural development at the first sign of weakness.

Cleveland

With considerable scrap due on old contracts, consumer interest is lacking. While prices are firm at recent levels, scrap appears to be coming out in better volume than it has for some time. Dealers are paying \$15.25 for No. 1 steel to fill the order recently placed by a Lorain consumer, \$15 for Cleveland delivery and \$15 to \$15.50 for shipment to Youngstown. One Valley district steel plant which had held up shipments is now taking scrap. Another is still regulating shipments.

St. Louis

The market here is quiet, and prices are unchanged. Offerings of dealers are slackening, and it is stated that they are not eager to sell their holdings below the present levels. District steel mills made no purchases of consequence during the week. Railroad offerings are light, the Missouri Pacific list of 120 carloads being the only sizable lot under consideration.

New York

The volume of day-to-day pickups has improved, but total deliveries are still not in sufficient quantity to satisfy brokers' order books. No. 1, No. 2 and cast grades are being collected for English and Japanese delivery at prices slightly better than those ruling several weeks ago.

There was an error last week in No. 1 and No. 2 quotations. The following is a correction for the use of dealers having contracts based on first-of-the-month prices. No. 1 and No. 2 steels at New York were quoted \$1 high, and should have been \$9.50 to \$10 and \$8.50 to \$9 respectively. Dealers' prices

at Jersey City, Newark and other North Jersey points should have been \$10 to \$10.75 and \$9 to \$9.75 for No. 1 and No. 2 respectively.

Philadelphia

The Budd Mfg. Co. April list of compressed bundles was split between the Pencoyd and Burham, Pa., consumers at a price well above \$13 f.o.b. Brokers continue to pay \$13 for No. 1 steel at Port Richmond for export and \$13.50 at Claymont, Del., on a recent 4000-ton, \$14 No. 1 order. Harrisburg is expected to release shipments soon. Despite these appearances of activity, the market here has no particular snap. Dealer turnover at present price levels is less than normal, and mills loath to meet brokers' terms for new tonnages. Although some sellers look forward to better than \$14 steel, there is a growing sentiment to the effect that the market has pretty well leveled off at present prices. One boat arrived at Port Richmond today to take on 1000 tons, another is due Friday for 2000 tons and a full cargo is expected to clear here late in the month.

Detroit

The scrap market appears to have hit bottom last week, and will probably remain quiet for several weeks. The present situation is considered artificial since steel mill operations continue to rise, and an eventual upturn in prices is anticipated. Increased activity on the part of jobbing foundries serving tool and die shops is tending to strengthen cast iron grades and a price rise is anticipated.

Boston

Pittsburgh is not much of a factor in the local market inasmuch as export prices are better. Some bundled skeleton is moving to Pittsburgh, however, and there is some interest in shafting and steel turnings. Breakable cast is going to eastern Pennsylvania at \$13 to \$13.50, and unstripped engine blocks for shipment via water to Detroit are moving at around \$8. Current export prices have reached new high levels under the stimuli of active demand for United Kingdom shipment and a further decrease in supplies. As compared with a week ago, No. 1 steel, turnings and stove plate are from 25c. to 75c. higher. Approximately 7300 tons left Boston last week for Scotland, and two steamers are finishing loading.

Buffalo

While no new sales are reported this week, the market continues very firm. Recent purchases by the largest mill in the district have resulted in an accumulation of about 30,000 tons of No. 1 steel at \$13.50. However, such a quantity is not sufficient for a month in view of the heavy open-hearth operation of this mill. Neither of the three large mill buyers here has purchased for some time, but they are expected to reenter the market shortly. Sentiment has improved here because of the strength of the Cleveland market. Dealers here are again declaring that a definite shortage of scrap is looming. Consequently, their price ideas are now higher, averaging around \$14.50 for No. 1 steel.

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 hvy. mltng.	\$15.50 to \$16.00
steel	
No. 2 hvy. mltng.	14.00 to 14.50
steel	
No. 2 RR. wrought.	15.50 to 16.00
Scrap rails	15.75 to 16.25
Rails, 3 ft. and under	16.50 to 17.00
Comp. sheet steel.	15.50 to 16.00
Hand bundled sheets	14.00 to 14.50
Hvy. steel axle tngs.	13.50 to 14.00
Machine shop tngs.	10.50 to 11.00
Short shov. tngs.	10.50 to 11.00
Mixed bor. tngs.	8.25 to 9.25
Cast iron borings.	10.50 to 11.00
Cast iron carwheels.	14.00 to 14.50
Hvy. breakable cast.	13.00 to 13.50
No. 1 cast	15.00 to 15.50
RR. knuckles & couplers	17.25 to 17.75
Rail, coil & leaf springs	17.25 to 17.75
Rolled steel wheels.	17.25 to 17.75
Low phos. billet crops	18.00 to 18.50
Low phos. sh. bar.	17.50 to 18.00
Low phos. punchings	17.00 to 17.50
Low phos. plate scrap	17.00 to 17.50
Steel car axles	16.00 to 16.50

Iron and Steel Scrap Prices

Hydraul. comp. sheets.	\$13.25 to \$13.75
Drop forge flashings	12.00 to 12.50
No. 1 busheling	13.00 to 13.50
Rolled carwheels	15.50 to 16.00
Railroad tires	16.00 to 16.50
Railroad leaf springs	15.50 to 16.00
Axle turnings	13.00 to 13.50
Steel coup. & knuckles	15.50 to 16.00
Coil springs	16.00 to 16.50
Axle turn. (elec.)	13.75 to 14.25
Low phos. punchings	16.50 to 17.00
Low phos. plates, 12 in. and under	16.50 to 17.00
Cast iron borings	7.50 to 8.00
Short shov. turnings	8.00 to 8.50
Machine shop turn...	7.50 to 8.00
Rerolling rails	15.50 to 16.00
Steel rails under 3 ft.	17.00 to 17.50
Steel rails under 2 ft.	17.25 to 17.75
Angle bars, steel...	15.75 to 16.25
Cast iron carwheels	14.00 to 14.50
Railroad malleable	18.00 to 18.50
Agric. malleable	14.50 to 15.00

Misc. stand-sec. rails	\$13.00 to 13.50
Railroad springs	14.00 to 14.50
Bundled sheets	9.50 to 10.00
No. 2 RR. wrought.	12.25 to 12.75
No. 1 busheling	7.50 to 8.00
Cast bor. & turn...	4.50 to 5.00
Rails for rolling	13.75 to 14.25
Machine shop turn...	4.00 to 4.50
Heavy turnings	9.25 to 9.75
Steel car axles	13.00 to 13.50
Iron car axles	15.00 to 16.00
No. 1 RR. wrought.	10.50 to 11.00
Steel rails under 3 ft.	13.50 to 14.00
Steel angle bars...	13.00 to 13.50
Cast iron carwheels	11.00 to 11.50
No. 1 machinery cast	11.25 to 11.75
Railroad malleable	14.25 to 14.75
No. 1 railroad cast	11.25 to 11.75
Stove plate	7.50 to 8.00
Agric. malleable	12.50 to 13.00

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 hvy. mltng.	\$14.50 to \$15.00
steel	
No. 2 hvy. mltng.	13.50 to 14.00
steel	
Comp. sheet steel.	13.50 to 14.00
Light bund. stamp's	10.00 to 10.50
Drop forge flashings	13.00 to 13.50
Machine shop turn...	8.50 to 9.00
Short shov. turn...	8.75 to 9.25
No. 1 busheling	13.50 to 14.00
Steel axle turnings	13.00 to 13.50
Low phos. billet crops	17.50 to 18.00
Cast iron borings	9.00 to 9.50
Mixed bor. & turn...	9.00 to 9.50
No. 2 busheling	9.00 to 9.50
No. 1 cast	15.00 to 15.50
Railroad grade bars	8.00 to 8.50
Stove plate	9.00 to 9.50
Rails under 3 ft.	17.50 to 18.00
Rails for rolling	17.00 to 17.50
Railroad malleable	17.75 to 18.50
Cast iron carwheels	15.00

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 hvy. mltng.	\$13.50 to \$14.00
steel	
No. 2 hvy. mltng.	12.50 to 13.00
Hydraulic bund. new	13.00 to 13.50
Hydraulic bund. old	10.50 to 11.00
Steel rails for rolling	14.50 to 15.00
Cast iron carwheels	14.50 to 15.00
Hvy. breakable cast.	13.50 to 14.00
No. 1 cast	14.00 to 14.50
Stove pl. (steel wks.)	11.00 to 11.50
Railroad malleable	16.50 to 17.00
Machine shop turn...	8.00 to 8.50
No. 1 blast furnace	6.25
Cast borings	6.00
Heavy axle turnings	10.25 to 11.75
No. 1 low phos. hvy.	17.00 to 17.50
Couplers & knuckles	17.00 to 17.50
Rolled steel wheels	17.00 to 17.50
Steel axles	16.50 to 17.00
Shafting	19.00 to 19.50
No. 1 RR. wrought.	13.00 to 13.50
Spec. iron & steel pipe	12.00 to 12.50
Bundled sheets	11.00 to 11.50
No. 1 forge fire	12.00 to 12.50
Cast borings (chem.)	10.50 to 13.00

CHICAGO

Delivered Chicago district consumers:

Per Gross Ton

Hvy. mltng. steel.	\$14.00 to \$14.50
Auto. hvy. mltng.	
steel	12.00 to 12.50
Shoveling steel	14.00 to 14.50

ST. LOUIS

Dealers' buying prices per gross ton delivered consumers' works:

Selected hvy. steel.	\$12.50 to \$13.00
Machine shop turn...	12.25 to 12.75
No. 2 hvy. melting	11.25 to 11.75
No. 1 locomotive tires	11.00 to 11.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 hvy. mltng.	steel	\$9.50 to \$10.00
No. 2 hvy. mltng.	steel	8.50 to 9.00
Hvy. breakable cast.	9.00 to 9.50	
No. 1 machinery cast	10.00 to 10.50	
No. 2 cast	8.75 to 9.00	
Stove plate	7.25 to 7.50	
Steel car axles	13.50 to 14.00	
Shafting	13.50 to 13.75	
No. 1 RR. wrought.	9.50 to 10.00	
No. 1 wrought long.	8.50 to 9.00	
Spec. iron & steel pipe	8.50 to 9.00	
Forge fire	7.50 to 8.00	
Rails for rollings	11.00 to 12.00	
Short shov. turnings	5.00 to 5.50	
Machine shop turn.	4.50 to 5.00	
Cast borings	4.50 to 5.00	
No. 1 blast furnace	3.00 to 3.50	
Cast borings (chem.)	10.00 to 11.00	
Unprepar. yard scrap	5.75 to 6.25	

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng.	steel	\$11.75 to \$12.25
No. 2 hvy. mltng.	steel	9.75 to 10.25
Scrap rails for mltng.	11.25 to 11.75	
Loose sheet clippings	7.25 to 7.75	
Bundled sheets	8.75 to 9.25	
Clean auto. cast...	12.50 to 13.00	
No. 1 railroad cast	12.00 to 12.50	
No. 1 railroad cast	11.50 to 12.00	
Stove plate	7.50 to 8.00	
Grate bars	9.00 to 9.50	
Brake shoes	9.50 to 10.00	

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng.	steel	\$13.50
No. 2 hvy. mltng.	steel	
No. 2 hvy. mltng.	steel	\$12.00 to 12.50
Scrap rails	13.00 to 13.50	
New hydraulic bundles	12.00 to 12.50	
Old hydraulic bundles	11.00	
Drop forge flashings	11.50 to 11.75	
No. 1 busheling	12.00 to 12.50	
Hvy. axle turnings	12.00 to 12.50	
Machine shop turn...	7.75 to 8.25	
Knuckles & couplers	15.50 to 16.00	
Coil & leaf springs	15.50 to 16.00	
Rolled steel wheels	15.50 to 16.00	
Low phos. billet crops	16.00 to 16.50	
Short shov. turnings	8.25 to 8.75	
Mixed bor. & turn...	8.25 to 8.75	
Cast iron borings	8.25 to 8.75	
No. 2 bushelings	7.00	
Steel car axles	14.00 to 14.50	
Iron axles	12.50 to 13.00	
No. 1 machinery cast	13.50 to 14.00	
Stove plate	11.00 to 11.50	
Steel rails, under 3 ft.	16.00 to 16.50	
Cast iron carwheels	12.00 to 12.50	
Railroad malleable	16.25 to 16.75	
Chemical borings	9.00 to 9.50	

CANADA

Dealers' buying prices per gross ton:

Toronto	Montreal
Hvy. melting steel	\$7.50
Rails, scrap	8.50
Machine shop turn...	4.00
Boiler plate	7.00
Hvy. axle turnings	4.50
Cast borings	5.00
Steel borings	4.00
Wrought pipe	4.00
Steel axles	8.50
Axes, wrought iron	9.00
Iron axles	12.00 to 12.50
No. 1 machinery cast	11.50
Stove plate	7.50
Standard carwheels	11.00
Malleable	7.00
Shoveling steel	6.50
Bushelings	6.00
Compressed sheets	6.50

YOUNGSTOWN

Per gross ton, delivered consumers' yards:

No. 1 hvy. mltng.	steel	\$16.00 to \$16.50
Hydraulic bundles	15.50 to 15.75	
No. 1 locomotive tires	11.00 to 11.50	

EXPORT

Brokers' Buying Prices, Per Gross Ton:

New York, delivered alongside barges	
No. 1 hvy. mltng.	
steel	\$9.50 to \$10.00
No. 2 hvy. mltng.	
steel	8.50 to 9.00
No. 2 cast	8.50 to 8.75
Stove plate	7.25 to 7.50
Rails (scrap)	11.00 to 11.25

Philadelphia, on cars at Port Richmond

No. 1 heavy melting steel...\$13.00

Boston, on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng.

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RAW AND SEMI-FINISHED STEEL

Billets, Blooms and Slabs
 F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Per Gross Ton

Rerolling \$28.00
 Forging quality 35.00

Delivered Detroit

Rerolling \$31.00
 Forging 38.00

Billets Only F.o.b. Duluth
 Rerolling \$30.00
 Forging 37.00

Sheet Bars
 F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.
Per Gross Ton

Open-hearth or Bessemer \$28.00

Skelp
 F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
 Grooved 1.80c.
 Universal 1.80c.
 Sheared 1.80c.

Wire Rods
 (Nos. 4 and 5)

Per Gross Ton
 F.o.b. Pittsburgh \$38.00
 F.o.b. Cleveland 38.00
 F.o.b. Chicago 39.00
 F.o.b. Anderson, Ind. 39.00
 F.o.b. Youngstown 39.00
 F.o.b. Worcester, Mass. 40.00
 F.o.b. Birmingham 41.00
 F.o.b. San Francisco 47.00
 F.o.b. Galveston 44.00

FINISHED IRON AND STEEL

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel
Base per Lb.
 F.o.b. Pittsburgh 1.85c.
 F.o.b. Chicago 1.90c.
 F.o.b. Gary 1.90c.
 F.o.b. Duluth 2.00c.
 Del'd Detroit 2.00c.
 F.o.b. Cleveland 1.90c.
 F.o.b. Buffalo 1.95c.
 Del'd Philadelphia 2.16c.
 Del'd New York 2.20c.
 F.o.b. Birmingham 2.00c.
 F.o.b. cars dock Gulf ports.... 2.25c.
 F.o.b. cars Pacific ports..... 2.40c.

Rail Steel (For merchant trade)

F.o.b. Pittsburgh 1.70c.
 F.o.b. Chicago 1.75c.
 F.o.b. Gary 1.75c.
 F.o.b. Moline, Ill. 1.75c.
 F.o.b. Cleveland 1.75c.
 F.o.b. Buffalo 1.80c.
 F.o.b. Birmingham 1.85c.
 F.o.b. cars dock Gulf ports.... 2.10c.
 F.o.b. cars dock Pacific ports.. 2.25c.

Billet Steel Reinforcing (Straight lengths as quoted by distributors)

F.o.b. Pittsburgh 2.05c.
 F.o.b. Chicago 2.10c.
 F.o.b. Gary 2.10c.
 Del'd Detroit 2.20c.
 F.o.b. Cleveland 2.10c.
 F.o.b. Youngstown 2.10c.
 F.o.b. Buffalo 2.10c.
 F.o.b. Birmingham 2.10c.
 F.o.b. cars dock Gulf ports.... 2.45c.
 F.o.b. cars dock Pacific ports.. 2.45c.

Rail Steel Reinforcing (Straight lengths as quoted by distributors)

F.o.b. Pittsburgh 1.90c.
 F.o.b. Chicago 1.95c.
 F.o.b. Gary 1.95c.
 F.o.b. Cleveland 1.95c.
 F.o.b. Youngstown 1.95c.
 F.o.b. Buffalo 1.95c.
 F.o.b. Birmingham 1.95c.
 F.o.b. cars dock Gulf ports.... 2.30c.
 F.o.b. cars dock Pacific ports.. 2.30c.

Iron

F.o.b. Chicago 1.80c.
 F.o.b. Pittsburgh (refined).... 2.10c.
 Delivered New York 2.05c.
 Delivered Philadelphia 2.10c.

Cold Finished Bars and Shafting*

Base per Lb.

F.o.b. Pittsburgh 2.10c.
 F.o.b. Chicago 2.15c.
 F.o.b. Gary 2.15c.
 F.o.b. Cleveland 2.15c.
 F.o.b. Buffalo 2.20c.
 Del'd Detroit 2.30c.
 Del'd eastern Michigan..... 2.35c.

*In quantities of 10,000 to 19,999 lb.

Plates

Base per Lb.

F.o.b. Pittsburgh 1.80c.
 F.o.b. Chicago 1.85c.
 F.o.b. Gary 1.85c.
 Del'd Cleveland 1.95c.
 F.o.b. Coatesville 1.90c.
 F.o.b. Sparrows Point 1.90c.
 Del'd Philadelphia 1.99c.
 Del'd New York 2.09c.
 F.o.b. Birmingham 1.95c.
 F.o.b. cars dock Gulf ports... 2.20c.
 F.o.b. cars dock Pacific ports.. 2.35c.
 Wrought iron plates, f.o.b. Pittsburgh 3.20c.

Floor Plates

F.o.b. Pittsburgh 3.35c.
 F.o.b. Chicago 3.40c.
 F.o.b. Coatesville 3.45c.
 F.o.b. cars dock Gulf ports... 3.75c.
 F.o.b. cars dock Pacific ports.. 3.90c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh 1.80c.
 F.o.b. Chicago 1.85c.
 Del'd Cleveland 1.95c.
 F.o.b. Buffalo 1.90c.
 F.o.b. Bethlehem 1.90c.
 Del'd Philadelphia 2.015c.
 Del'd New York 2.0625c.
 F.o.b. Birmingham (standard).... 1.95c.
 F.o.b. cars dock Gulf ports... 2.20c.
 F.o.b. cars dock Pacific ports.. 2.35c.

Steel Sheet Piling

Base per Lb.

F.o.b. Pittsburgh 2.15c.
 F.o.b. Chicago 2.25c.
 F.o.b. Buffalo 2.25c.
 F.o.b. cars dock Gulf ports.... 2.60c.
 F.o.b. cars dock Pacific ports.. 2.60c.

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb. per gross ton.... \$36.37½
 Angle bars, per 100 lb. 2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton \$35.00
 Light rails (from rail steel) per gross ton 34.00

Base per 100 Lb.

Spikes, 9/16 in. and larger 2.60
 Spikes, 1/2 in. and smaller..... 2.60
 Tie plates, steel 1.90
 Tie plates, Pacific Coast ports.. 2.00
 Track bolts, to steam railroads.. 3.60
 Track bolts, to jobbers, all sizes (per 100 counts) 70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot Rolled

Base per Lb.

No. 10, f.o.b. Pittsburgh 1.85c.
 No. 10, f.o.b. Gary 1.95c.
 No. 10, del'd Detroit 2.05c.
 No. 10, del'd Philadelphia 2.16c.
 No. 10, f.o.b. Birmingham 2.00c.
 No. 10, f.o.b. cars dock Pacific ports 2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh 2.40c.
 No. 24, f.o.b. Gary 2.50c.
 No. 24, del'd Detroit 2.45c. to 2.60c.
 No. 24, del'd Philadelphia 2.71c.
 No. 24, f.o.b. Birmingham 2.55c.
 No. 24, f.o.b. cars dock Pacific ports 3.05c.
 No. 24, wrought iron, Pittsburgh 4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh... 2.50c.
 No. 10 gage, f.o.b. Gary 2.60c.
 No. 10 gage, f.o.b. Detroit 2.70c.
 No. 10 gage, del'd Philadelphia 2.81c.
 No. 10 gage, f.o.b. Birmingham 2.65c.
 No. 10 gage, f.o.b. cars dock Pacific ports 3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh... 2.95c.
 No. 20 gage, f.o.b. Gary 3.05c.
 No. 20 gage, del'd Detroit 3.15c.
 No. 20 gage, del'd Philadelphia 3.26c.
 No. 20 gage, f.o.b. Birmingham 3.10c.
 No. 20 f.o.b. cars dock Pacific ports 3.50c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh... 3.10c.
 No. 24, f.o.b. Gary 3.20c.
 No. 24, del'd Philadelphia 3.41c.
 No. 24, f.o.b. Birmingham 3.25c.
 No. 24, f.o.b. cars dock Pacific ports 3.70c.
 No. 24, wrought iron, Pittsburgh 4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh 3.40c.
 F.o.b. Gary 3.50c.
 F.o.b. cars dock Pacific ports.. 4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh 2.95c.
 No. 20, f.o.b. Gary 3.05c.
 No. 20, f.o.b. Birmingham 3.55c.
 No. 20, f.o.b. cars dock Pacific ports 3.55c.
 No. 10, f.o.b. Pittsburgh 2.35c.
 No. 10, f.o.b. Gary 2.45c.
 No. 10, f.o.b. Birmingham 2.95c.
 No. 10, f.o.b. cars dock Pacific ports 2.95c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh 2.75c.
 No. 28, Gary 2.85c.
 No. 28, cars dock Pacific Coast ports 3.35c.

Tin Plate

Base per Box

Standard cokes, f.o.b. Pittsburgh district mill \$5.25
 Standard cokes, f.o.b. Gary..... 5.35c
 Standard cokes, f.o.b. cars dock Pacific ports 5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)
 8-lb. coating I.C..... \$10.00
 15-lb. coating I.C..... 12.00
 20-lb. coating I.C..... 13.00
 25-lb. coating I.C..... 14.00
 30-lb. coating I.C..... 15.25
 40-lb. coating I.C..... 17.50

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 In.

Base per Lb.

All widths up to 24 in., P'gh... 1.85c.
 All widths up to 24 in., Chicago 1.95c.
 All widths up to 24 in., del'd Detroit 2.05c.
 All widths up to 24 in., Birmingham 2.00c.
 Cooperage stock, Pittsburgh 1.95c.
 Cooperage stock, Chicago 2.05c.

Cold-Rolled Strips

Base per Lb.

F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.89c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

Per Lb.

Bright wire	2.40c.
Spring wire	3.05c.

Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are \$2 a ton above. Birmingham \$3 above, and Pacific Coast prices \$9 a ton above Pittsburgh or Cleveland.

To the Trade

Base per Keg

Standard wire nails	\$2.10
Smooth coated nails	2.10

Base per 100 Lb.

Annealed fence wire	\$2.65
Galvanized fence wire	3.00
Polished staples	2.80
Galvanized staples	3.05
Barbed wire, galvanized	2.60
Twisted barbless wire	2.60
Woven wire fence, base column	\$58.00
Single loop bale ties, base column	51.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., mill prices are \$2 a ton over Pittsburgh except for woven wire fence, which is \$3 over Pittsburgh and Birmingham mill prices are \$3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are \$6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of \$6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE**AND TUBING****Welded Pipe**

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

In.	Steel	Black Galv.	Wrought Iron	In.	Black Galv.	Black Galv.
1/8	57	37	1/8 .. +91 1/2 +138	1/8	.. +91 1/2 +138	1/8 .. +91 1/2 +138
1/4	.. % 60	44 1/2	1/4 & 3/8 +17 1/2 +21 1/2	1/4	.. % 60	44 1/2
1/2	64 1/2	55	1/2 .. 31 1/2 15	1/2	64 1/2	55
3/4	67 1/2	59	3/4 .. 36 1/2 20 1/2	3/4	67 1/2	59
1 to 3	69 1/2	61 1/2	1 & 1/4 39 1/2 25 1/2	1 to 3	69 1/2	61 1/2
			1 1/2 .. 43 1/2 28			
			2 .. 41 1/2 26			

Lap Weld

2	62	53 1/2	2	37	22 1/2
2 1/2	to 3.65	56 1/2	2 1/2 to 3 1/2	38	25
3 1/2	to 6.67	58 1/2	4 to 8 .. 40	28 1/2	
7 &	8.66	56 1/2	9 to 12 .. 38	24 1/2	
9 &	10.65 1/2	56			
11 &	12.64 1/2	55			

1/8	55 1/2	42 1/2	1/8 .. +13 +45 1/2	1/8	.. +13 +45 1/2	1/8 .. +13 +45 1/2
1/4	.. % 57 1/2	46 1/2	1/4 & 3/8 +21 1/2 +34 1/2	1/4	.. % 57 1/2	46 1/2
1/2	62 1/2	54 1/2	1/2 .. 32 1/2 17 1/2	1/2	62 1/2	54 1/2
3/4	66 1/2	58 1/2	3/4 .. 37 1/2 22 1/2	3/4	66 1/2	58 1/2
1 to 3	68	61	1 to 2 .. 43 1/2 29	1 to 3	68	61

2	60	52 1/2	2	40	26
2 1/2	to 3.64	56 1/2	2 1/2 to 4 .. 45 1/2 33		
3 1/2	to 6.67 1/2	60	4 1/2 to 6 .. 45	33 1/2	
7 &	8.66 1/2	57	7 & 8 .. 46	33	
9 &	10.65 1/2	56	9 to 12 .. 41 1/2 30		
11 & 12	64 1/2	55			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	\$48.40
*4-in. del'd Chicago	51.40
6-in. and larger, del'd New York	45.20
4-in. del'd New York	48.20
*6-in. and larger, Birmingham	40.00
*4-in. Birmingham	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	48.00
F.o.b. dock, Seattle	48.50
4-in. f.o.b. dock, San Francisco or Los Angeles	51.00
F.o.b. dock, Seattle	51.50

*Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$39.

Birmingham, and \$47.40, delivered Chicago and 4-in. pipe, \$42, Birmingham, and \$50.40 a ton, delivered Chicago.

BOLTS, NUTS, RIVETS AND SET SCREWS**Bolts and Nuts**

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:
1/2 in. x 6 in. and
smaller

Larger than 1/2 in. 70 and 10

Lag bolts 70 and 10

Plow bolts, Nos. 1, 2, 3, and 7

heads 70 and 10

Hot-pressed nuts, blank or tapped,

square 70 and 10

Hot-pressed nuts, blank or tapped,

hexagon 70 and 10

C.p.c. and t. square or hex. nuts,

blank or tapped 70 and 10

Semi-finished hexagon nuts,

U.S.S. and S.A.E., all sizes to

and incl.

1 in. diameter 60, 20 and 15

Larger than 1 in. diameter

60, 20 and 15

Stove bolts in packages, Pittsburgh,

7 1/2 and 10

Stove bolts in packages, Chicago,

7 1/2 and 10

Stove bolts in packages, Cleveland,

7 1/2 and 10

Stove bolts in bulk, Pittsburgh .. 82 1/2

Stove bolts in bulk, Chicago .. 82 1/2

Stove bolts in bulk, Cleveland .. 82 1/2

Tire bolts .. 55

Large Rivets

(1 1/2-in. and larger)

Per Cent Off List

F.o.b. Pittsburgh 70 and 5

F.o.b. Cleveland 70 and 5

F.o.b. Chicago and Birm'g'm. 70 and 5

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh 70 and 5

F.o.b. Cleveland 70 and 5

F.o.b. Chicago and Birm'g'm. 70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c, per 100 lbs. on lots of 200 lb. or more) Per Cent Off List

Milled cap screws, 1 in. dia. and

smaller 80, 10 and 10

Milled standard set screws, case

hardened, 1 in. dia. and smaller 75

Milled headless set screws, cut

thread 1/4 in. and smaller 75

Upset hex. head cap screws U.S.S.

or S.A.E. thread, 1 in. and

smaller 85

Upset set screws, cut and oval

points 75 and 10

Milled studs 65 to 65 and 10

Alloy and Stainless Steel**Alloy Steel Ingots**

F.o.b. Pittsburgh, Chicago, Canton,

Massillon, Buffalo, Bethlehem.

Uncropped \$40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton,

Bethlehem, Massillon, Buffalo, Bethlehem.

Base price, \$49 a gross ton.

Alloy Steel Bars

Price del'd Detroit is \$52.

F.o.b. Pittsburgh, Chicago, Buffalo,

Bethlehem, Massillon or Canton.

Open-hearth grade, base 2.45c.

Delivered price at Detroit is .2.60c.

S.A.E. Series Numbers

Alloy Differential per 100 lb.

2000 (1/2% Nickel)	\$0.25
2100 (2 1/2% Nickel)	0.95
2300 (3 1/2% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30) Molybdenum (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
6100 Chromium Vanadium Bar	1.00
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.40
Carbon Vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars 1/2c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 2.95c. base

STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C.)

(Base Prices f.o.b. Pittsburgh)

Per Lb.

Forging billets	19.55c.
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PIG IRON AND RAW MATERIALS

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.; Bethlehem, Birdsboro and Swedesland, Pa., and Sparrows Point, Md.	\$20.50
Delivered Boston Switching District	21.00
Delivered Brooklyn, N.Y.	22.9289
Delivered Newark or Jersey City	21.9873
Delivered Philadelphia	21.3132
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	19.50
F.o.b. Jackson, Ohio	21.25
Delivered Cincinnati	20.5807
Delivered Canton, Ohio	20.8482
Delivered Columbus, Ohio	21.64
Delivered Mansfield, Ohio	21.3832
Delivered Indianapolis	21.9289
Delivered South Bend, Ind.	21.6935
Delivered Milwaukee	20.57
Delivered Davenport, Iowa	21.3832
Delivered Kansas City	22.2178
F.o.b. Duluth	20.00
Delivered St. Paul	21.94
F.o.b. Provo, Utah	17.50
Delivered San Francisco, Los Angeles or Seattle	22.315
F.o.b. Birmingham	15.50

*Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

F.o.b. Everett, Mass.; Bethlehem, Birdsboro, Swedesland and Steelton, Pa., and Sparrows Point, Md.	\$20.00
Delivered Boston Switching District	20.50
Delivered Newark or Jersey City	21.9873
Delivered Philadelphia	20.8132
F.o.b. Buffalo	18.50
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	19.00
Delivered Cincinnati	20.0807
Delivered Canton, Ohio	20.3482
Delivered Mansfield, Ohio	20.8832
F.o.b. Jackson, Ohio	20.75
F.o.b. Provo, Utah	17.00
F.o.b. Birmingham	14.50

Bessemer

F.o.b. Everett, Mass.; Bethlehem, Birdsboro and Swedesland, Pa.	\$21.50
Delivered Boston Switching District	22.00
Delivered Newark or Jersey City	22.9873
Delivered Philadelphia	22.3132
F.o.b. Buffalo and Erie, Pa. and Duluth	20.50
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Birmingham	20.00
Delivered Cincinnati	21.0807
Delivered Canton, Ohio	21.3482
Delivered Mansfield, Ohio	21.8832

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.

Gray Forge

Valley furnace \$19.00
Pittsburgh district furnace 19.00

Charcoal

Lake Superior furnace \$22.00
Delivered Chicago 25.2528
Delivered Buffalo 25.595

CANADIAN PIG IRON

Per Gross Ton

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	22.50
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.	
Per Gross Ton	

Domestic, 80% (carload) \$75.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$26.00
50-ton lots 3-mo. shipment	24.00

F.o.b. New Orleans 26.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	\$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	130.00

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton	Per Gross Ton
6.00 to 6.50%	12%... \$29.75
6.50 to 7.00%	23.25 13%... 30.75
7.00 to 7.50%	23.75 14%... 32.25
7.50 to 8.00%	24.25 15%... 33.75
8.00 to 8.50%	24.75 16%... 35.25
8.50 to 9.00%	25.25 17%... 36.75
9.00 to 9.50%	25.75
9.50 to 10.00%	26.25
10.00 to 10.50%	26.75
10.50 to 11.00%	27.25
11.00 to 11.50%	27.75
11.50 to 12.00%	28.25

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Manganese 2 to 3%, \$1 a ton additional. For each unit of manganese over 3%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton	Per Gross Ton
10.00 to 10.50%	\$27.75 13%... \$31.75
10.50 to 11.00%	28.25 14%... 33.25
11.00 to 11.50%	28.75 15%... 34.75
11.50 to 12.00%	29.25 16%... 36.25
12%.....	30.25 17%... 37.75

Manganese 2 to 3%, \$1 a ton additional. For each unit of manganese over 3%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	.... \$1.30
Ferrotungsten, lots of 5000 lb.	1.35
Ferrotungsten, smaller lots	.... 1.40
Ferchromium, 4 to 6% carbon and up, 65 to 70% Cr per lb.	contained Cr delivered, in car- loads, and contract 10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferovanadium, del. per lb. contained V	.... \$2.70 to \$2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y.	.... \$2.50
Ferrocobaltitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	.... \$137.50
Ferrocobaltitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	.... 142.50

Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton

58.50

Ferrophosphorus, electric, 24%, in carlots, f.o.b. Anniston, Ala., per gross ton with \$3 unitage, freight equalized with Nashville, Tenn.

75.00

Ferromolybdenum, per lb. Mo del.

95c.

Calcium molybdate, per lb. Mo del.

80c.

Silico spiegel, per ton, f.o.b. furnace, carloads

\$38.00

Ton lots or less, per ton

45.50

Silico-manganese, gross ton, delivered.

2.50% carbon grade 85.00

2% carbon grade 90.00

1% carbon grade 100.00

Spot prices \$5 a ton higher

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, iron	51.50%
Old range, non-Bessemer, iron	51.50%
iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% iron dry Spanish or Algeria	10.25c.
Iron, low phos., Swedish, average, 68 1/2% iron	10.25c.
Iron, basic or foundry, Swedish, aver. 65% iron	9.50c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	25c.
Manganese, African, Indian, 49-51%	26c.
Manganese, Brazilian, 46 to 48 1/2%	24c.
Per Net Ton Unit	
Tungsten, Chinese, wolframite, duty paid, delivered, nominal	\$16.00
Tungsten, domestic, scheelite delivered, nominal	16.00
Per Gross Ton	
Chrome, 45% Cr ₂ O ₃ , lamp, c.i.f. Atlantic Seaboard (African)	\$17.50
45 to 46% Cr ₂ O ₃ (Turkish)	\$16.50 to 17.00
48% Cr ₂ O ₃ (African)	20.50
48% min. Cr ₂ O ₃ (Turkish)	19.25
Chrome concentrate, 50% and over Cr ₂ O ₃ , c.i.f. Atlantic Seaboard	22.00
52% Cr ₂ O ₃ (Turkish)	21.75
48 to 49% Cr ₂ O ₃ (Turkish)	19.25

FLUORSPAR

Per Net Ton

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines for all rail shipment	.... \$18.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	.... 20.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	.... 21.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	.... 35.00

FUEL OIL

Per Gal. f.o.b. Bayonne, N.J.

No. 3 distillate	4.25c.
No. 4 industrial	3.87 1/2c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.25c.
No. 4 industrial	3.87 1/2c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	5.00c.
No. 5 industrial fuel oil	3.77c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	6.00c.
No. 4 industrial	5.75c.
No. 5 industrial	5.25c.

COKE AND COAL

Coke

Per Net Ton

Furnace, f.o.b. Connells-	
ville Prompt	\$3.65 to \$3.80
Foundry, f.o.b. Connells-	
ville Prompt	4.25 to 5.75
Foundry, by-product,	
Chicago ovens, for de-	
livery outside switching	
district.....	9.00
Foundry, by-product, de-	
livery in Chicago	
switching district.....	9.75
Foundry, by-products,	
New England, deliv-	
ered.....	11.50
Foundry, by-product,	
Newark or Jersey City,	
delivered.....	9.65
Foundry, by-product,	
Philadelphia	9.38
Foundry, by-product,	
Cleveland, delivered.....	9.75
Foundry, by-product,	
Cincinnati, del'd.....	9.50
Foundry, Birmingham.....	6.50
Foundry, by-product,	
St. Louis, f.o.b. ovens.	8.00
Foundry, by-product,	
del'd St. Louis.....	9.00
Foundry, from Birming-	
ham, f.o.b. cars docks,	
Pacific ports.....	14.75

Coal

Per Net Ton

Mine run steam coal,	
f.o.b. W. Pa. mines...\$1.50 to \$1.75	
Mine run coking coal,	
f.o.b. W. Pa..... 1.90 to 2.10	
Gas coal, $\frac{3}{4}$ -in. f.o.b.	
Pa. mines..... 2.00 to 2.25	
Mine run gas coal, f.o.b.	
Pa. mines..... 1.80 to 2.00	
Steam slack, f.o.b. W.	
Pa. mines..... 1.00 to 1.25	
Gas slack, f.o.b. W. Pa.	
mines..... 1.20 to 1.45	

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works

	Inter-
High-heat	mediate
Duty	Duty
Brick	Brick
Pennsylvania	\$45.00
Maryland	45.00
New Jersey	50.00
Ohio	40.00
Kentucky	45.00
Missouri	45.00
Illinois	45.00
Ground fire clay,	
per ton	7.00

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	\$45.00
Chicago District	54.00
Birmingham	\$48.00 to 50.00
Silica cement per net ton.....	8.00

Chrome Brick

Per Net Ton

Standard f.o.b. Baltimore,	
Plymouth Meeting and Ches-	
ter, Pa.....	\$45.00
Chemically bonded f.o.b. Balti-	
more, Plymouth Meeting and	
Chester, Pa.....	45.00

Magnesite Brick

Per Net Ton

Standard, f.o.b. Baltimore and	
Chester, Pa.....	\$65.00
Chemically bonded, f.o.b. Balti-	
more	55.00

Grain Magnesite

Per Net Ton

Imported, f.o.b. Baltimore and	
Chester, Pa. (in sacks).....\$45.00	
Domestic, f.o.b. Baltimore and	
Chester, in sacks..... 40.00	
Domestic, f.o.b. Chewelah,	
Wash.....	22.00

WAREHOUSE PRICES

PITTSBURGH

Base per Lb.

Plates	3.15c.
Structural shapes.....	3.15c.
Soft steel bars and small shapes	2.95c.
Reinforcing steel bars	2.95c.
Cold-finished and screw stock:	
Rounds and hexagons.....	3.35c.
Squares and flats.....	3.35c.
Hoops and bands under $\frac{1}{4}$ in.	3.20c.
Hot-rolled annealed sheets (No.	
24), 25 or more bundles.....	3.30c.
Galv. sheets (No 24), 25 or	
more bundles.....	3.95c.
Galv. corrug. sheets (No. 28),	
per square (more than 3750	
lb.)	\$3.69
Spikes, large	3.10c.
Track bolts, all sizes, per 100	
count	65 per cent off list
Machine bolts, 100 count,	
65 per cent off list	
Carriage bolts, 100 count,	
65 per cent off list	
Nuts, all styles, 100 count,	
65 per cent off list	
Large rivets, base per 100 lb.	\$3.80
Wire, black, soft ann'd, base	
per 100 lb.	2.90c.
Wire, galv. soft, base per 100	
lb.	3.25c.
Common wire nails, per keg	2.35c.
Cement coated nails, per keg	2.35c.

Cold-fin. shafting and screw

Rounds and hexagons.....	3.81c.
Flats and squares.....	3.81c.
Cold-rolled; strip, soft and	
quarter hard.....	3.36c.
Hoops	3.56c.
Bands	3.56c.
Hot-rolled sheets (No. 10)....	3.31c.
Hot-rolled ann'd sheets (No.	
24*)	3.89c.
Galvanized sheets (No. 24*)..	Special
Long terne sheets (No. 24)....	5.25c.
Standard tool steel.....	11.00c.
Wire, black annealed (No. 10)....	3.40c.
Wire, galv. (No. 10).....	3.75c.
Tire steel, 1 x $\frac{1}{2}$ in. and larger	
3.75c.	
Open-hearth spring	
steel	4.00c. to 10.00c.
Common wire nails, base per	
keg	\$3.21

Per Cent Off List

Machine bolts, square head and	
nut:	
All diameters .....	.65 and 10
Carriage bolts, cut thread:	
All diameters.....	.65 and 10
Boiler tubes:	
<i>Per 100 Ft.</i>	
Lap welded, 2-in.....	\$18.05
Seamless welded, 2-in.....	19.24
Charcoal iron, 2-in.....	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide,
20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes.....	3.45c.
Bars, soft steel (rounds and	
flats)	3.25c.
Bars, soft steel (squares, hex-	
agons, ovals, half ovals and	
half rounds).....	3.40c.
Cold-fin. rounds, shafting,	
screw stock.....	3.75c.
Hot-rolled annealed sheets	
(No. 24)	4.10c.
Galv. sheets (No. 24).....	4.65c.
Hot-rolled sheets (No. 10)....	3.30c.
Black corrug. sheets (No. 24)....	4.10c.
*Galv. corrug. sheets.....	4.65c.
Structural rivets.....	4.00c.
Boiler rivets.....	4.10c.

Per Cent Off List

Tank rivets, 7/16 in. and smaller	.55
Machine and carriage bolts, lag	
screws, fitting up bolts, bolt	
ends, plow bolts, hot-pressed	
nuts, square and hexagon,	
tapped or blank, semi-finished	
nuts; all quantities.....	70

*No. 26 and lighter take special
prices.

PHILADELPHIA

Base per Lb.

*Plates, $\frac{1}{4}$ -in. and heavier....	2.98c.
*Structural shapes.....	2.98c.
*Soft steel bars, small shapes,	
iron bars (except bands)....	3.03c.
*Reinforc. steel bars, sq.	
twisted and deformed.....	2.96c.
Cold-finished steel bars.....	3.76c.
*Steel hoops	3.43c.
*Steel bands, No. 12 and 3/16	
in. incl.	3.18c.
Spring steel	5.00c.
*Hot-rolled anneal. sheets (No.	
24)	3.65c.
*Galvanized sheets (No. 24)....	4.40c.
*Hot-rolled annealed sheets	
(No. 10)	3.08c.
Diam. pat. floor plates, $\frac{1}{4}$ in.	4.95c.
Swedish iron bars.....	6.25c.

These prices are subject to quantity differential except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 25 bundles or over.

†For less than 2000 lb.

CLEVELAND

Base per Lb.

Plates and struc. shapes.....	3.31c.
Soft steel bars.....	3.00c.
Reinforc. steel bars.....	2.10c.
Cold-finished steel bars.....	3.50c.
Flat-rolled steel under $\frac{1}{4}$ in.	3.36c.
Cold-finished strip.....	\$3.00c.

Hot-rolled annealed sheets	
(No. 24).....	3.91c.
Galvanized sheets (No. 24)....	4.61c.
Hot-rolled sheets (No. 10)....	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
*Black ann'l'd wire, per 100 lb.	\$2.40
*No. 9 galv. wire, per 100 lb....	2.75
*Com. wire nails, base per keg..	2.35

*Outside delivery 10c. less.

*For 5000 lb. or less.

CINCINNATI

Base per Lb.

Plates and struc. shapes.....	3.42c.
Bars, rounds, flats and angles.....	3.22c.
Other shapes.....	3.37c.
Rail steel reinforce. bars.....	3.25c.
Hoops and bands, 3/16 in. and lighter	3.47c.
Cold-finished bars.....	3.72c.
Hot-rolled annealed sheets (No. 24).....	4.02c.
Galv. sheets (No. 24).....	4.72c.
Hot-rolled sheets (No. 10)....	3.22c.
Structural rivets.....	4.35c.
Small rivets.....	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over).....	\$2.88
Com. wire nails, base per keg: Any quantity less than carload..	3.04
Cement c'td nails, base 100-lb. keg	3.50
Chain. lin. per 100 lb.....	8.35
<i>Net per 100 Ft.</i>	
Seamless steel boiler tubes, 2-in.	\$20.37
4-in.	48.14
Lap-welded steel boiler tubes, 2-in.	19.38
4-in.	45.32

BUFFALO

Base per Lb.

Plates	3.88c.
Struc. shapes.....	3.25c.
Soft steel bars.....	3.05c.
Reinforcing bars.....	2.60c.
Cold-fin. flats and sq.	3.55c.
Rounds and hex.	3.55c.
Cold-rolled strip steel.....	3.19c.
Hot-rolled annealed sheets (No. 24)	4.06c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide).....	3.63c.
Galv. sheets (No. 24)	4.70c.
Bands	3.43c.
Hoops	3.43c.
Heavy hot-rolled sheets	3.18c.
Com. wire nails, base per keg.....	\$3.15
Black wire, base per 100 lb. (2500-lb. lots or under)	3.50
(Over 2500 lb.)	3.40

BOSTON

Base per Lb.

Beams, channels, angles, tees, zees	3.54c.
H beams and shapes	3.54c.
Plates—Sheared, tank, and univ. mill, 1/4 in. thick and heavier	3.56c.
Floor plates, diamond pattern.	5.36c.
Bar and bar shapes (mild steel)	3.45c.
Bands 3/16 in. thick and No. 12 ga. incl.....	3.65c. to 4.65c.
Half rounds, half ovals, ovals and bevels	4.70c.
Tire steel	4.70c.
Cold-rolled strip steel	3.245c.
Cold-finished rounds, squares and hexagons	3.90c.
Cold-finished flats	3.90c.
Blue annealed sheets, No. 10 ga.	3.65c.
One pass cold-rolled sheets No. 24 ga.	4.20c.
Galvanized steel sheets, No. 24 ga.	4.90c.
Lead coated sheets, No. 24 ga	5.85c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

Base per Lb.

Soft steel bars	3.09c.
Structural shapes	3.42c.
Plates	3.42c.
Floor plates	5.17c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Hot-rolled sheets (No. 10)	3.14c.

Galvanized sheets (No. 24)**..	4.72c.
Bands	3.39c.
Hoops	3.39c.
†Cold-finished bars	3.64c.
Cold-rolled strip	3.18c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.29c.*
Bolts and nuts, in cases, 70 and 10 per cent off list	
Broken cases	70 per cent off

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials.

*Price applies to 1,000 lb. and over.

†With reduction in chemical extras.

**0.25c. off list for 10 to 25 bundles;
0.50c. for 25 bundles and over. Detroit delivery only.

MILWAUKEE

Base per Lb.

Plates and structural shapes..	3.31c.
Soft steel bars, rounds up to 8 in., flats and fillet angles.....	3.11c.
Soft steel bars, squares and hexagons	3.26c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)....	3.16c.
Hot-rolled annealed 3/16—24 in. to 48 in. wide incl.....	3.41c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 20)	4.66c.
Cold-finished steel bars.....	3.61c.
Cold-rolled strip	3.33c.
Structural rivets (keg lots) ..	3.86c.
Boiler rivets, cone head (keg lots)	3.96c.
Track spikes (keg lots)	3.91c.
Track bolts (keg lots)	4.91c.
Black annealed wire	3.15c.
Com. wire nails	2.60c.
Cement coated nails	2.60c.

Per Cent Off List

Machine bolts, 1/2 and smaller....
Larger than 1/2x6.....
Hot-pressed nuts, sq. and hex.
tapped or blank (keg lots)

65 and 10

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

Base per Lb.

Mild steel bars, rounds	3.25c.
Structural shapes	3.45c.
Plates	3.45c.
Cold-finished bars	4.02c.
Bands and hoops	3.55c.
Hot-rolled annealed sheets, No. 24	3.90c.
Galvanized sheets, No. 24.....	4.50c.
Cold-rolled sheets, No. 20	4.95c.

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BALTIMORE

Base per Lb.

*Mild steel bars	3.00c.
**Reinforcing bars	2.85c.
*Structural shapes	3.00c.
†Plates	3.00c.
†Hot-rolled sheets, No. 10....	3.10c.
†Hot-rolled annealed sheets, No. 24	3.60c.
†Galvanized sheets, No. 24....	4.30c.
*Bands	3.20c.
*Hoops	3.45c.
§Cold-rolled rounds	3.78c.
§Cold-rolled squares, hex. and flats	3.78c.
Rivets	4.40c.
Bolts and nuts, per cent off list	60 and 10

*Quantity extras per size apply.

†Quantity extras per thickness apply.

Hot-rolled quantity extras are: 2000

lb. and over, base: 1500 lb. to 1999 lb.

add 15c. per 100 lb.; 1000 lb. to 1499

lb. add 30c.; 0 to 999 lb. add 50c.

125 bundles and over, base. For 1
to 9 bundles add 50c. per 100 lb.; for
10 to 24 bundles add 25c.

§Base for 1000 lb. and over. For
500 to 999 lb. add 25c. per 100 lb.;
for 300 to 499 lb. add \$1.00; for 0 to
299 lb. add \$1.75; for combined order
under 100 lb. add \$3.00.

**For orders 4000 lb. to 9999 lb.
Add 15c. per 100 lb. for orders 2000

to 3999 lb.; add 65c. for orders less
than 2000 lb.

CHATTANOOGA

Base per Lb.

Mild steel bars	3.36c.
Iron bars	3.36c.
Reinforcing bars	3.36c.
Structural shapes	3.56c.
Plates	3.56c.
Hot-rolled sheets, No. 10.....	3.36c.
Hot-rolled annealed sheets No. 24	4.16c.
Galvanized sheets, No. 24	4.86c.
Steel bands	3.61c.
Cold-finished bars	4.13c.

MEMPHIS

Base per Lb.

Mild steel bars	3.47c.
Shapes, bar size	3.47c.
Iron bars	3.47c.
Structural shapes	3.67c.
Plates	3.67c.
Hot-rolled sheets, No. 10.....	3.47c.
No. 24	4.27c.
Galvanized sheets, No. 24	4.80c.
Steel bands	3.72c.
Cold-drawn rounds	3.89c.
Cold-drawn flats, squares, hexagons	5.89c.
Structural rivets	4.25c.
Bolts and nuts, per cent off list	65
Small rivets, per cent off list.	50

NEW ORLEANS

Base per Lb.

Mild steel bars	3.35c.
Reinforcing bars	3.50c.
Structural shapes	3.55c.
Plates	3.55c.
Hot-rolled sheets, No. 10	3.55c.
No. 24	4.35c.
Galvanized sheets, No. 24	4.95c.
Steel bands	3.95c.
Cold-finished steel bars	4.30c.
Structural rivets	4.25c.
Boiler rivets	4.25c.
Common wire nails, base per keg	\$2.65
Bolts and nuts, per cent off list	70

PACIFIC COAST

Base per Lb.

San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.25c.	3.60c.
Shapes, standard	3.25c.	3.60c.
Soft steel bars	3.25c.	3.60c.
Reinforcing bars, f.o.b. cars dock Pacific ports..	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.00c.	4.35c.
Hot-rolled sheets (No. 10)	3.35c.	3.70c.
Galv. sheets (No. 24)	4.50c.	4.95c.
Cold-finished steel		
Rounds	5.80c.	5.85c.
Squares and hexagons	7.05c.	7.10c.
Flats	7.55c.	7.60c.
Common wire nails—base per keg less carload	\$3.20	\$3.20
		\$3.20

All items subject to differentials
for quantity.



THIS WEEK'S MACHINE TOOL ACTIVITIES

By L. M. WAITE

... Machine tool assemblers aid flood areas.

... Stocks of superseded machines are depleted.

... Delivery conditions push order decisions on both replacement and production needs.

THE machine tools business enters the second quarter of 1936 with an outstanding record as an agency of business recovery during the first quarter.

It is early to estimate the total requirements of machine tools which will result from flood damage, particularly from New England and Pennsylvania users. Two considerations are involved in the immediate situation; the number of totally damaged machines, and the number of obsolete machines which may be replaced because of even minor damage, but which normally might have been retained in service for some little time. In this latter class, many quotations have been outstanding for over a year and up to three years. These are now being transferred from prospective to active sales files for rejuvenation by sales representatives. The following local reports include adjacent territory:

Eastern Dealers

Dealers covering much of the territory between Buffalo and Boston, report the first quarter of 1936 as very satisfactory in volume of diversified business. Practically without exception order reports for the first week in April are said to represent probabilities for a top month.

Metropolitan

A number of machine tool dealers report a continued satisfactory volume of sales into April. Two direct representatives call attention to the fact that extra demonstrators have been on the territory constantly since Nov. 15, with inquiries indicating that the necessity for their services will extend well into the year. They hold that individual machine replacements, particularly in New Jersey, are developing into steady orders.

New England

Machine tool manufacturers are cooperating in the renewal of production activities in flood-damaged plants through the loaning of assemblers to expedite reconditioning of machines. This service, because of skilled labor shortage in machine tool plants, represents a real co-operative sacrifice which is receiving much appreciative comment.

Detroit

Equipment covering cylinder blocks and related parts has been particularly active during the past week. Packard is said to be closing on connecting rod machinery after having reached decisions on blocks and crankshaft production methods. Press orders are active and

dealers report heavy inquiries on standard lines of machines, indicating a probable rush on replacement orders.

The crediting, in this column last week, of the Associated Machine Tool Dealers with full sponsorship in apprenticeship training which has resulted in placing 720 young men in Detroit shops was in error. The Manufacturers Committee for Apprenticeship Training and the Employers Association should have been featured in the activity.

Cincinnati

One manufacturer is reported to have received a large General Electric order. Foreign business has eased somewhat. The Middle West shows little change from steady individual machine orders. Inquiry remains consistently brisk with increased calls for tooling layouts. The full range of Cincinnati-made tools is involved in inquiries.

Cleveland

One maker of automatic screw machines is reported as three months behind on orders. Considerable reasonably prompt demand is anticipated in the way of automotive equipment orders. Packard is said to be making inquiries for additional needs in connection with a low-priced car. Orders for standard machines are in fair volume over wide areas, and running from one to three machines. Buying in the immediate district is light.

Chicago

Several large lists seem to be in the making, including \$200,000 for tractor motor equipment for Allis-Chalmers. The Santa Fe, Rock Island, Chicago & North Western and the Milwaukee Road may buy in the near future. Nash Motors at Kenosha, Wis., is said to be in deep equipment study. Price advances are not generally uniform and competition is keen from a price viewpoint.

Superseded Equipment

Available models of machines, which were standard prior to the Sept. machine tool show in Cleveland, are reported as being rapidly absorbed. Several manufacturers are refusing orders for their few remaining stock machines if and when orders call for incorporation of features which distinguish the machines of yesterday from those of today. The heavy buying of today's tools has released numbers of machines to the used tool markets. It is said that in several areas these are being rapidly snapped up for use as the basis of single purpose adaptation.

PLANT EXPANSION AND EQUIPMENT BUYING



... High Point, N. C., municipal hydro-electric generating plant to cost \$7,500,000.

... Belfalls Light & Power Co., Bartlett, Tex., plans about 300 miles of new transmission and distributing lines.

... Lehigh Briquetting Co., Lehigh, N. D., will spend about \$300,000 for additions and equipment to its fuel briquetting plant.

... Hygrade Sylvania Corp., Salem, Mass., to build new plant for radio tube production.

... Packard Electric Corp., Warren, Ohio, announces \$200,000 extension to cable wire manufacturing plant.

◀ NORTH ATLANTIC ▶

Anaconda Wire & Cable Co., 25 Broadway, New York, will build one-story addition to branch plant at Marion, Ind., including modernization and improvements in present works, for which general contract has been let to B. J. Nelson, Marion. Cost close to \$50,000 with equipment. Frank Hart is manager at Marion.

Signal Supply Officer, Army Base, Brooklyn, asks bids until April 14 for parts for keying heads, keying head drive, high speed tape recorders, tape pullers, etc. (Circular 184).

American Can Co., 230 Park Avenue, New York, plans one-story addition to branch plant at Indianapolis. Cost over \$100,000 with equipment.

Remington Screw & Bolt Mfg. Co., Cold Spring, N. Y., recently organized, has purchased former local plant and property of West Point foundry, comprising one-story plant units totaling 50,000 sq. ft. floor space on 60-acre tract. Part of plant will be modernized by new owner.

United States Industrial Alcohol Co., 60 East Forty-second Street, New York, has asked bids for extensions in buildings Nos. 49 and 51, and other plant improvements at branch works at Curtis Bay, Baltimore. Cost over \$50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 14 for 55,325 lamp-type fuse indicators (Schedule 7474) for Brooklyn and Portsmouth, N. H., navy yards; vacuum tubes (Schedule 7572), face masks and hoods for inside blasting, and helmets for outside blasting (Schedule 7581); until April 17, three motor-driven milling machines (Schedule 7595), 25,300 ft. air hose for diving apparatus (Schedule 7593), 4000 welders' goggle frames, 8000 welders' goggles, 6200 filter goggle lenses, 9000 eyecup goggle frames, 42,000 goggle lenses,

12,000 rubber frame goggles, 105,600 helmet or handshield lenses, and 400 welders' handshields (Schedule 7587) for Brooklyn yard; aluminum chairs (Schedule 7545) for Brooklyn, Mare Island and Puget Sound yards; 277 tank level indicating systems and spare parts (Schedule 7604) for Brooklyn and Philadelphia yards.

Fruhauf Trailer Co., 32-40 Forty-third Avenue, Long Island City, manufacturer of motor trailers and parts, with main plant at Detroit, has leased two one-story buildings, each 75 x 100 ft., at 45-21 and 45-27 Thirty-seventh Street, Long Island City, for new branch assembling plant, with service and repair facilities.

Department of Sanitation, 125 Worth Street, New York, Thomas W. Hammond, commissioner, plans modernization and replacements in automotive and other road equipment, snow-removal machinery, street-flushing equipment, etc. Cost about \$7,500,000. Appropriation will be arranged soon.

Brown-Forman Distillery Co., 522 Fifth Avenue, New York, has awarded general contract to Garst-Cowen Construction Co., 1420 Goddard Street, Louisville, for extensions and improvements in distillery at 1908 Howard Street, Louisville. Cost close to \$40,000 with equipment.

Colonial Neon Co., Inc., 480 Tonnele Avenue, Jersey City, N. J., manufacturer of illuminated signs and displays, has leased one-story building at North Bergen, N. J., for new plant.

Commanding Officer, Ordnance Department, Picatinny Arsenal, Dover, N. J., asks bids until April 16 for 205 100-lb. demolition bombs (Circular 276), 490 600-lb. demolition bombs (Circular 277), until April 17, steel washers, bushings, nipples, plugs, steel strapping, wire staples, etc. (Circular 280).

P. Ballantine & Sons, 57 Freeman Street, Newark, N. J., have let general contract

to Turner Construction Co., New York, for one-story storage and distributing plant, 100 x 150 ft., at Hamden, Conn. Cost over \$50,000 with mechanical-handling, loading and other equipment. Joseph S. Shanley, 33 Washington Street, Newark, is architect. Company has also let contract for addition to Newark plant, primarily for storage and distribution. Cost close to \$65,000 with equipment.

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until April 14 for heavy-duty casters and heavy-duty caster wheels (Aero Req. 1074).

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until April 13 for one complete unit to revolve shells of 105 mm., 155 mm., and 5-in. calibers, while being painted sprayed; until April 14, 13,700 annealed shell body forgings, type A, and for 15,100 similar forgings, other type (Circular 405); until April 15, one hardness testing machine, direct-reading, light load type (Circular 415), for reworking metals into 300,000-lb. cartridge brass cups (Circular 390).

◀ BUFFALO DISTRICT ▶

Schutte Pulverizer Corp., 621 Eggert Road, Buffalo, manufacturer of pulverizing machinery and parts, has let general contract to Walter W. Grupp, 1170 Jefferson Avenue, for one-story plant unit. Cost close to \$40,000 with equipment.

New York State Electric & Gas Corp., 177 Central Avenue, Buffalo, has secured permission to issue bonds for \$1,000,000, entire fund to be used for extensions in transmission and distributing lines for rural electrification in Cortland, Wyoming, Columbia, Niagara, Erie and other counties, totaling 665 miles, with power substations and service facilities. Work will be carried out during 1936 and will cost \$1,330,000, remainder of fund to be secured from regular annual expansion budget.

Red Flare Signal Corp., Fostoria, Ohio, manufacturer of signal devices and equipment, reflector lights for motor trucks, etc., is negotiating for acquisition of former plant of Sinclair Glass Co., Dunkirk, N. Y. Structure will be remodeled for branch factory, storage and distributing plant.

◀ NEW ENGLAND ▶

Hinsdale Paper Mfg. Co., Hinsdale, N. H., has asked bids on general contract for rebuilding of mill destroyed by fire several months ago. Cost over \$100,000 with equipment. McClintock & Craig, 458 Bridge Street, Springfield, Mass., are consulting engineers.

United Illuminating Co., 128 Temple Street, New Haven, Conn., has plans for one-story addition, 62 x 108 ft., to steam power department at steam-electric generating plant in Steele Point district, Bridgeport, Conn., installation to include high-pressure boiler units and auxiliaries, stokers, pumps and other equipment. Cost over \$100,000 with equipment. Westcott & Mapes, New Haven, are architects and engineers.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until April 15 for 4000 rifle cleaning rods, caliber 0.22 (Circular 201); until April 17, one universal radius and cutter grinder (Circular 189).

Hygrade Sylvania Corp., Boston and Bridge Streets, Salem, Mass., manufacturer of radio tubes, incandescent lamps, etc., has let general contract to Leslie R. Porter Co., 156 Stuart Street, for new two and three-story plant at South Salem for radio tube production. Two units will be erected, each 80 x 400 ft., with two-story wing extensions, 60 x 120 ft. and 60 x 80 ft. Cost close to \$250,000 with machinery. Lockwood Greene Engineers, Inc., 40 Central Street, Boston, is architect and engineer. Walter E. Poor is vice-president in charge of engineering and production.

Board of City Commissioners, Norwalk, Conn., E. J. Finnegan, clerk, asks bids until April 20 for new water filtration plant, capacity 5,000,000 gal. per day, with pumping machinery, chemical-feed equipment, filter machinery, wash-water and other machinery. Nicholas S. Hill, Jr.,



REEVES
Vari-Speed Motodrive

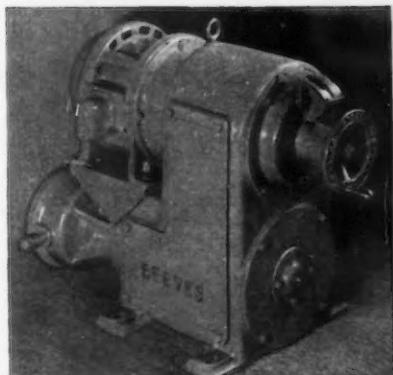
Newest Addition to Reeves Line

● To MEET the need for a variable speed drive which combines in a compact, self-contained enclosure any standard make of constant speed motor, a variable speed mechanism and (where desired) speed reduction gears, REEVES has developed the Vari-Speed Motodrive.

In this new drive, there is no restriction to one make of driving motor. Any foot type constant speed motor, within standard NEMA dimensions, may be used.

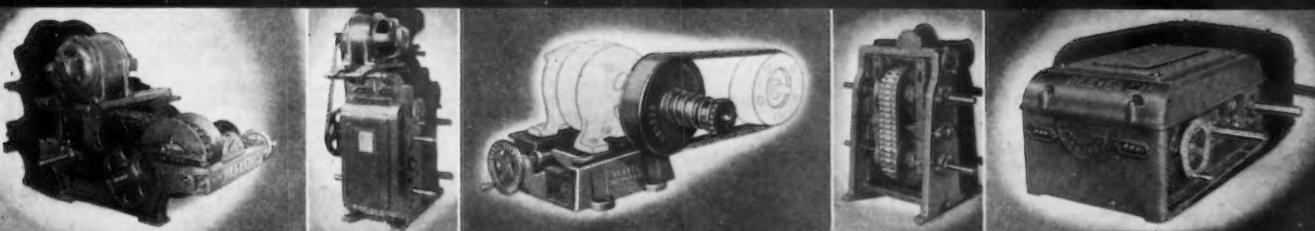
The Motodrive combines features of the *time-tested* REEVES Variable Speed Transmission and REEVES

Vari-Speed Motor Pulley. Speed variation is infinite, accurate, positive. Two attractive designs—horizontal and vertical—each in four sizes for motors $\frac{1}{4}$ to $7\frac{1}{2}$ h. p. and covering speed ratios 2:1 through 6:1. In various combinations of sizes, speed ratios and reduction gears, output speeds from 1.35 r. p. m. to 3480 r. p. m. are obtainable. An ideal unit for machine tools and equipment where space is limited; also where direct connection is necessary. Send for Catalog IM-363, REEVES PULLEY COMPANY, Columbus, Indiana.



Vertical design Motodrive with speed reduction gears. In all units variable speed shaft may be extended on either side. Exceedingly adaptable for mounting in any position.

REEVES BUILDS A COMPLETE LINE OF SPEED CONTROL EQUIPMENT

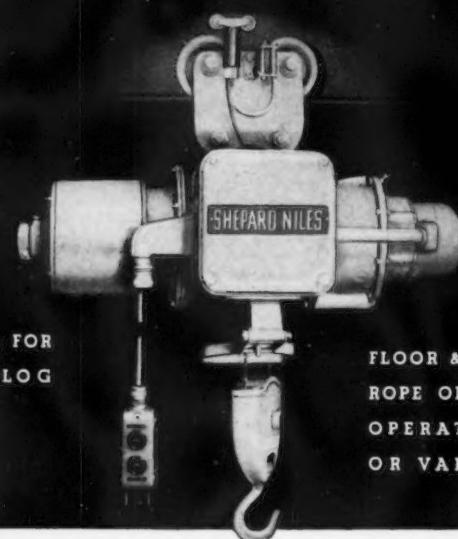


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Electric Hoists

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MOST COMPREHENSIVE LINE OF CRANES & HOISTS

112 East Nineteenth Street, New York, is consulting engineer.

◀ SOUTH ATLANTIC ▶

City Council, High Point, N. C., E. M. Knox, city manager, plans new municipal hydroelectric generating plant on Roanoke River, including transmission line to city limits, power substation and switching station, and electrical distributing lines. Cost about \$7,500,000, of which amount \$3,357,000 will be arranged through Federal grant.

Post Quartermaster, Fort McPherson, Ga., asks bids until April 27 for one electric-operated turbine-type deep-well pumping unit with auxiliary equipment.

Southern Waxed Paper Co., 840 Woodrow Avenue, S. W., Atlanta, Ga., has let general contract to Sam N. Hodges Co., 262 Rumson Road, N.E., for one-story addition, 50 x 200 ft. Cost close to \$65,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 14 for two engine lathes (Schedule 7562), one ram-type turret lathe (Schedule 7565), one power hammer (Schedule 7568), for one horizontal precision boring, drilling and milling machine, all motor-driven (Schedule 7570), for Charleston, S. C., Navy Yard.

◀ OHIO AND INDIANA ▶

Packard Electric Corp., Warren, Ohio, manufacturer of cable, wires, etc., plans one-story addition, about 50,000 sq. ft. floor space, with improvements in present plant. New equipment will cost close to \$75,000. Entire project will cost about \$200,000. Company is a unit of General Motors Corp.

International Harvester Co., 606 South Michigan Avenue, Chicago, has let general contract to A. G. Samuelson, 320 South Clairmont Street, Springfield, Ohio, for new power plant at motor truck works, Springfield. Cost close to \$150,000 with high-pressure boilers and other equipment.

G. H. R. Foundry Co., 1030 East Hermon Avenue, Dayton, Ohio, manufacturer of gray iron castings, etc., plans installation of new equipment for increased output. Contract for building remodeling and improvements has been let to E. E. Swank, 2049 Salem Avenue.

Steel & Tubes, Inc., 224 East 131st Street, Cleveland, plans new welding mill and auxiliary equipment for high carbon steel tube production, at Elyria, Ohio, plant. Existing buildings will be remodeled for unit. Cost about \$85,000.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until April 13 for two gas-operated flashing beacon lamp assemblies (Circular 728); until April 14, streamline tie rods (Circular 701), aircraft bolts, turnbuckles, eyes, nuts, washers, etc. (Circular 702), compass bracket assemblies, compass bracket vibration absorber retainers, bombers' lower exit door levers, handle shafts, etc. (Circular 694); until April 15, seamless steel tubing, chrome molybdenum (Circular 726); until April 16, gage assemblies and gages (Circular 709), unions, nuts, ring packing and wrenches (Circular 711), five to ten 25,000-gal. cylindrical tanks (Circular 725); until April 17, 1500 running lamp lenses (Circular 731), ammunition box assemblies and ammunition box mount assemblies (Circular 708), carburetor air intake manifold assemblies (Circular 733).

Morgan Packing Co., Austin, Ind., meat packer, has plans for one-story addition, 100 x 240 ft. Cost over \$85,000 with equipment.

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., asks bids until April 13

for two gas-fired bake ovens, 54 x 38 x 72 in. (Circular 239); until April 24, one 7-cu. ft. concrete mixer (Circular 238).

◀ WESTERN PA. DIST. ▶

Edgewater Steel Co., Oakmont, Pa., manufacturer of steel wheels, steel tires, etc., has plans for one-story addition, 70 x 225 ft. Cost over \$100,000 with equipment. Erection will be carried out by company forces.

Standard Ultramarine Co., Fifth and Twenty-first Streets, Huntington, W. Va., manufacturer of industrial chemicals, colors, etc., has let contract to James J. Weiler & Sons, 202 Elm Street, for four-story addition. Cost over \$40,000 with equipment.

Domestic Coke Corp., Fairmont, W. Va., plans installation of mechanical conveyors, loaders and other equipment in connection with new dock on Monongahela River, to be used in conjunction with by-products plant at Norwood. Cost about \$65,000.

Kane Power Co., Kane, Pa., plans extensions and improvements in power plant, including new equipment. Cost over \$50,000.

◀ SOUTH CENTRAL ▶

Cummins Distilleries Corp., Athertown, Ky., has plans for new one-story mechanical-bottling plant, in connection with general expansion and improvements in distillery, on which work has been started. Other units will also be built. Entire project will cost close to \$100,000 with equipment.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until April 13 for steel towers and accessories for new power transmission line from Wheeler hydroelectric generating plant to Columbia; also until April 17 for ventilating system for Wheeler power plant.

John A. Wathen Distillery Co., Lebanon, Ky., has plans for extensions and improvements in distilling plant, including new equipment. Work will include new powerhouse. Later, a multi-story storage and distributing building will be erected, 85 x 100 ft. Entire project will cost over \$100,000.

High Rock Ginger Ale Co., 705 South Fifteenth Street, Louisville, plans installation of new mechanical-bottling machinery and auxiliary equipment, labeling machinery and other equipment. S. J. Beierfeld is general manager.

United States Engineer Office, Vicksburg, Miss., asks bids until April 27 for 3,200 ft. wire rope, $\frac{5}{8}$ to $1\frac{1}{8}$ -in. diameter (Circular 236).

Gibson County Electric Membership Corp., Trenton, Tenn., C. E. Garner, president, recently organized, has concluded Federal financing for new transmission and distributing lines in Gibson County, with power substation and service facilities for installations at Riverside, New Enterprise, Brazil, Gibson and other points, about 100 miles. Cost about \$125,000 with equipment.

◀ MICHIGAN DISTRICT ▶

Packard Motor Car Co., 1580 East Grand Boulevard, Detroit, has let general contract to Barton Malow Co., 1900 East Jefferson Street, for new foundry, including crane-way extension. Cost over \$50,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

Frankenmuth Brewing Co., 1020 Pine Street, Detroit, plans extensions and improvements in brewery, including equipment. Addition will be built to storage and distributing department. Company has recently disposed of stock totaling over \$150,000, a considerable part of proceeds to be used for purpose noted.

Producers' Refining Co., Inc., West Branch, Mich., has plans for new oil refinery, comprising several units, for which superstructure will begin soon. Cost close to \$100,000 with equipment. Roy J. Miller Engineering Co., 20 North Wacker Drive, petroleum engineer, will supervise construction.

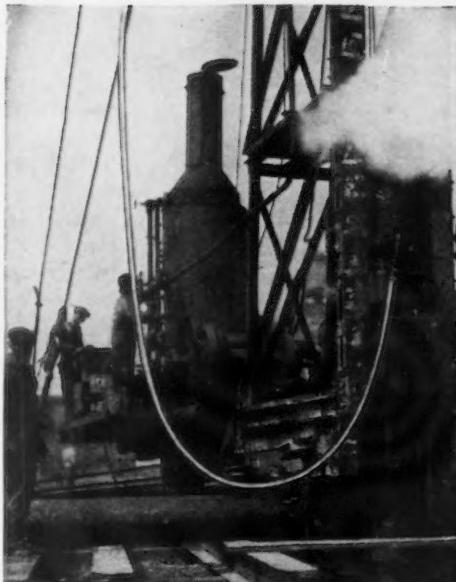
Saginaw Steering Gear Co., Saginaw, Mich., has plans by Frantz & Spence,

MANHATTAN CONDOR AIR - HOSE - SUPER-MASTER STEAM



Condor Air Hose in a steel fabricating mill.

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Super-Master Steam Hose on a pile driver.

Condor Air Hose is designed for heavy, rough service. It is proving its dependability and long life in shops, mines, engineering projects and drilling operations everywhere. Thousands of feet are in use at the T. V. A. Project. Condor Air Hose is manufactured exclusively of the strongest grade of heavy cotton duck, impregnated through and through with a tenacious rubber bond, wrapped about a thick, tough, oil-resistant tube, and having on the outside a wear-resisting, slow-aging rubber cover. Also supplied molded type in long lengths. One experience with Condor Air Hose economy will convince you.

High Pressure Super-Master Steam Hose has the heat-resistance of asbestos, the strength of steel and the flexibility of rubber. You are at liberty to test it in the most severe service and it will measure up. Super-Master Steam Hose is a patented construction consisting of special heat-resisting rubber, insulated with a thick asbestos layer. Two plies of spiralled bead wire cushioned between layers of rubber provide ample tensile strength for rough handling and all steam pressures up to 200 pounds per square inch. For general all-around steam hose service, we offer Condor.

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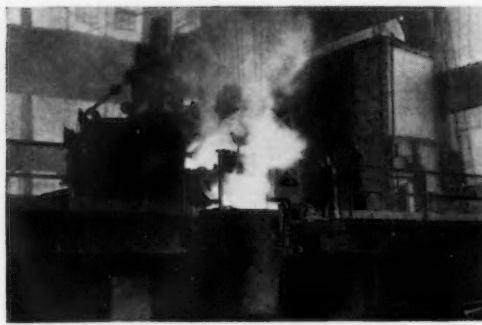
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COMPLETE control of all processing from selection of the melting charge to the finished condition is the N. F. & O. guarantee of quality in forgings furnished to your specifications—Smooth Forged, Hollow Bored, Rough or Finish Machined.

NATIONAL FORGE AND ORDNANCE CO.
IRVINE, WARREN COUNTY, PENNA., U.S.A.

Saginaw, architects, for one-story addition, and improvements in present plant. Cost about \$30,000 with equipment.

Barkley-Grow Aircraft Corp., Detroit, has been organized with capital stock of \$750,000 to manufacture airplanes, parts and accessories and has taken over former Brock-Schlesinger hangar at Detroit city airport for manufacturing plant, with general offices and engineering department at 2017 Penobscot Building. Production of twin-engine all-metal transports is scheduled to begin within 30 days. Plant has 9760 sq. ft. of floor space, which will be increased 50 per cent by construction of a balcony over rear half of shop. Commander Harold B. Grow is president; A. S. Barkley and Paul T. Young, vice-presidents; R. K. Stoezler, secretary-treasurer, and Dwight Maier, chief engineer.

◀ WASHINGTON DIST. ▶

Board of District Commissioners, District Building, Washington, asks bids until April 14 for cast iron lamp posts and lamp-post parts and one 330-ton concrete mixer.

Cumberland Brewery Co., Cumberland, Md., has asked bids on general contract for one-story addition for storage and distribution. Cost over \$40,000 with equipment. Shattuck & Layer, 221 North LaSalle Street, Chicago, are architects.

General Purchasing Officer, Panama Canal, Washington, asks bids until April 13 for steel ring bolts, 10,000 ft. tinned copper wire, 5000 ft. No. 14 A.W.G. cable, 500,000 lb. steel reinforcing bars, two metal spray guns, turnbuckles, etc. (Schedule 3135); until April 20, one 15-ton overhead electric traveling crane for storage building for overhaul equipment, Miraflores, Canal Zone (Schedule 3136).

Capital Transit Co., Thirty-sixth and M Streets, N.W., Washington, has let general contract to Charles H. Tompkins Co., 630 Connecticut Avenue, N.W., for one-story motor bus service, repair and garage building, with parts division and other mechanical departments. Cost about \$175,000 with equipment. Arthur B. Heaton, 1211 Connecticut Avenue, N.W., is architect.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until April 16 for one 30-gal. tumbling machine (Circular 138).

J. S. Johnson Corp., 117 West Washington Street, Hagerstown, Md., manufac-

turer of pharmaceutical products, plans installation of new conveying and other mechanical-handling equipment, semi-automatic bottling machinery, filling machinery, etc.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 17 for 14 marker buoy cables (Schedule 7524), high-pressure air-reducing valves and spare parts (Schedule 7550), insulated electric cable (Schedule 7546); until April 21, one motor-driven tool grinder (Schedule 7558), cartridge fuses and plug fuses (Schedule 7574), air hose fittings (Schedule 7551) for Eastern and Western Navy Yards; until April 14, one electric dynamometer for Philadelphia Navy Yard (Schedule 7557).

◀ SOUTHWEST ▶

Curtiss-Wright Corp., Robertson, St. Louis, operating Curtiss-Wright Airplane Co., Lambert-St. Louis Flying Field, Curtiss Aeroplane & Motor Co., and other interests, manufacturers of airplanes and parts, is planning expansion in plants and manufacturing facilities for large increase in production. A new stock issue is being arranged to provide funds for project. Executive offices are at 30 Rockefeller Plaza, New York. Guy W. Vaughn is president.

Board of Education, Library Building, Kansas City, Mo., George Tinker, secretary, plans new three-story and basement manual training-high school at Meyer Boulevard and Indiana Avenue, for which bids will be asked on general contract this month. Cost about \$750,000 with equipment. Wight & Wight, First National Bank Building, are architects; Nate W. Downes, Finance Building, is mechanical engineer.

Hussman-Ligonier Co., 2401 North Lefingwell Avenue, St. Louis, manufacturer of electric refrigerators, food machines and parts, etc., has let general contract to William H. & Nelson Cuniff Co., 3320 Lindell Street, for one-story addition. Cost about \$45,000.

Midland-Valley Casket Co., 1621 North Twenty-fifth Street, Kansas City, Kan., has leased one-story building, 95 x 200 ft., to be erected at Fairfax Industrial District, Kansas City, for new plant. Cost over \$70,000 with equipment. Charles E. Keyser, 609 Minnesota Avenue, is architect.

Johnston Tin Foil & Metal Co., 6608 South Broadway, St. Louis, has let general contract to Joseph E. Stauder, 5405 South

Broadway, for two-story addition, 110 x 117 ft. Cost over \$60,000 with equipment. O'Meara & Hills, 5709 Waterman Street, are architects.

Belfalls Light & Power Co., Bartlett, Tex., William G. Morrison, engineer, plans new transmission and distributing lines in parts of Bell, Falls and Milan Counties, about 300 miles, with service facilities. A new power plant, using Diesel engine-generating units and auxiliaries, will be built near Bartlett. Cost about \$450,000. Financing is being arranged through Federal aid.

◀ MIDDLE WEST ▶

Dole Valve Co., 1923 West Carroll Street, Chicago, manufacturer of air valves for steam radiators and other valve specialties, has asked bids on general contract for three-story and basement addition, 70 x 130 ft. Cost close to \$85,000 with equipment. Ivar Viehe-Naess, 5809 Ridge Street, is architect.

Signal Corps Procurement District, 1819 West Pershing Road, Chicago, asks bids until April 21 for parts for keyboard perforators, comprising 46 items in all (Circular 51).

Milwaukee Road, Milwaukee Station, Minneapolis, Minn., will soon take bids on revised plans for new engine house with shop facilities at Austin, Minn. Cost over \$35,000 with equipment.

St. Joe Mining & Milling Co., Boulder, Colo., plans new ore reduction and flotation mill at gold and silver mining properties at Valmont, Colo. Cost over \$75,000 with equipment.

Board of Water and Light Commissioners, Austin, Minn., J. C. Todd, secretary, asks bids until April 14 for equipment for electric light and power plant, including boiler unit and accessories, stoker, water preheater, coal and ash-handling equipment, etc. Fund of \$130,000 has been arranged, including improvements in building. Ralph D. Thomas, 1200 Second Avenue South, Minneapolis, is consulting engineer.

Clearing Machine Corp., 6499 West Sixty-fifth Street, Chicago, manufacturer of power presses for metal stamping trades, has contracted with Clearing Industrial District for an addition to its plant, 60 x 141 ft., on which work will start at once. A 50-ton traveling crane will be housed in new structure.

Purchase Division, Bureau of Supply, Treasury Department, Washington, asks bids until April 13 for milling cutters, metal-slitting saws, screw-slitting cutters, convex cutters, double angle cutters, gear cutters, corner rounding cutters, etc., for Hamilton, Mont. (Proposal 3327-SP).

Lehigh Briquetting Co., Lehigh, N. D., will soon purchase equipment for extensions and improvements in fuel briquette plant, including carbonizing, gas-cleaning, oil distillation and other machinery; power house equipment, coal-handling and mining machinery, etc. Entire project will cost over \$300,000. K. A. Loven, 1506 Seventh Street North, Fargo, N. D., is engineer; Walter H. Wheeler, Metropolitan Life Building, Minneapolis, is consulting engineer.

United States Engineer Office, Rock Island, Ill., asks bids until April 14 for one dragline machine, crawler type (Circular 116).

Magnetic Mfg. Co., 625 South Twenty-eighth Street, Milwaukee, manufacturer of separators, concentrators, clutches and brakes, is placing contracts for one-story shop extension, 60 x 90 ft., cost about \$35,000 with equipment.

J. M. Bruce Foundry Co., Cedar Grove, Wis., started repairs immediately following fire on March 25 which ruined roof and floor of gray iron shop, 45 x 60 ft.

◀ PACIFIC COAST ▶

Hepburn & McTavish, Ltd., 432 Colton Street, Los Angeles, distiller, has plans for new distillery, comprising three main units. Cost close to \$90,000 with equipment. Arlos R. Sedgley, 910 North Serrano Avenue, is architect.

United States Engineer Office, South Figueroa Street, Los Angeles, asks bids

Balancing the **BUDGET**



WHY an Automotive Parts Manufacturer Bought 8 New Machines

PROFIT-MINDED plant executives have found a new way to help balance the budget. An eastern automotive parts plant,* for example, has invested in 8 National Acme Automatic Screw Machines. This equipment, while representing a large capital outlay, has actually helped them to bring about a better relationship between income and expense.

These new machines have increased production approximately 30%. Down time has dropped. Tool life has jumped almost 50%. Maintenance costs are negligible. Work is finished with greater accuracy. And on one large production part, a secondary machining operation is eliminated entirely.

Perhaps our engineers can save you money, too. If you are using old type automatic screw machines, the chances are we can show you some amazing budget-balancing figures. *Name on request.

The National Acme Company, Cleveland, O.



Note to Corporation Treasurers

There is no better investment today than the purchase of modern machine tools. If you are looking for safety of principal, adequate return and freedom from fluctuating values, we suggest that you consider re-equipping with 1936 model screw machines.

ACME

GRIDLEY AUTOMATICS

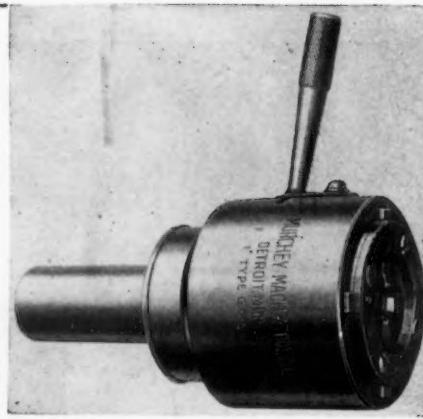
MURCHEY TYPE "G" Self-Opening DIE HEAD

Sizes 7/16" to 6"

This die head is the pull-off type for stationary spindles. It is opened positively and instantaneously by self-contained trips actuated either externally or internally.

Set-up time is reduced to a minimum by ample adjustments for thread diameters and by chaser removal which may be effected without taking off the cap.

In this die head all parts are hardened and ground.



For economy the chasers are interchangeable with the Murchey "C-O" rotating die head. This type "G" die head is rendering excellent service in shops where production is vital.

MURCHEY MACHINE & TOOL CO., 951 Porter St., Detroit, Mich.

Collapsible Taps, Self Opening Die Heads; Bolt Threading, Pipe Threading, and Pipe Cutting Off Machinery.

until April 15 for one 50-cu. ft. per sec. motor-driven pumping unit, and for two natural gas engine-driven water pumps, same capacity, each complete with necessary starting and control equipment (Circular 543).

California Hardware Co., 500 East First Street, Los Angeles, has let general contract to Stanton-Reed Co., 816 West Fifth Street, for five-story storage and distributing plant, 60 x 125 ft. Cost about \$100,000 with equipment. John C. Austin and Fredric M. Ashley, Chamber of Commerce building, are architects.

Utah Power & Light Co., Salt Lake City, Utah, will soon begin construction of new steam-operated electric generating plant near Provo, Utah. Project will include a high-tension transmission line from new station to Park City, Utah, and vicinity, about 25 miles. Entire development will cost about \$1,500,000.

Bureau of Reclamation, Denver, asks bids until April 20 for two 24-in. internal differential control valves for drum-gate control chambers, Arrowhead dam, Boise Project, Idaho (Specifications 785-D).

Olympia Brewing Co., Olympia, Wash., has let general contract to A. D. Belanger, 222 Westlake Avenue North, for one-story additions, 21 x 175 ft., and 40 x 50 ft., primarily for extensions in mechanical bottling department. Cost over \$50,000 with equipment. Joseph Wohleb, Chambers Block, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 21 for one motor-driven wood surfer for Mare Island Navy Yard (Schedule 7575), one 32-in. motor-driven shaper for San Diego yard (Schedule 7555), two motor-driven hand jointers for Puget Sound yard (Schedule 7566).

◀ FOREIGN ▶

Calthrop Brothers, Ltd., Merseyside, Lancashire, England, manufacturer of oil-cake and other industrial oil products, plans addition for large increase in present capacity. Cost over \$150,000 with machinery.

American Smelting & Refining Co., 120 Broadway, New York, plans new reduction and refining mill at gold-mining properties in Big Bell mining district, western Australia. Cost close to \$200,000 with equipment.

through a plan of employee representation.

A medical program, including organized first-aid work, a company dispensary or hospital, a full or part-time physician, a company nurse, and physical examinations.

An organized safety program.

An organized training program for the systematic training of one or more types of employees.

Some form of sports program, which may be simple or elaborate depending on the local situation.

A publication for employees to keep them informed about company and local affairs.

Food service of some kind; such as, a cafeteria, lunch counter, or trucks which go through the plant and from which employees may purchase food.

A mutual benefit association—an organization sponsored by the employees but often aided by management, which provides weekly benefits for members incapacitated by sickness.

A loan plan which permits employees to borrow money from the company to meet emergencies, the loans usually being repaid through small payroll deductions.

A group life insurance policy for dependents of employees to help them through the difficult period of readjustment made necessary by the employee's death.

And, finally, some form of pension plan. This plan may be informal and limited in its application to a few long-service employees who are completely without other means of support, or it may be a comprehensive, actuarially sound pension plan whereby, through joint contributions, employees, with the assistance of management, are building up annuities which will be payable when they reach retirement age.

Voluntary Programs For Employee Welfare

GROUP life insurance, medical care, and some form of pension plan are included in the typical personnel program of American business establishments, according to a report on voluntary activities for improvement of working conditions in American business concerns just issued by the National Industrial Conference Board. This survey of the policies of 2452 companies with over 4,500,000 employees, indicates that company activities for promoting the economic security of employees and contributing to their well-being are prevalent in all fields of business enterprise.

To depict the prevalence of various personnel policies, the board has constructed a "composite" or "average" industrial relations program, which includes activities in effect in companies employing 50 per cent or more of the total number of employees covered by the investigation. This typical program includes:

A policy of centralized hiring, transfer, and discharge, which eliminates favoritism and permits employees to be moved about when not needed in their regular departments, thereby prolonging their employment.

Assignment to an individual or department of special responsibility for proper personnel administration.

Negotiation with the management by part or all of the employees

Nickel Company Names Field Men

INTERNATIONAL NICKEL CO., INC., has announced the establishment of field representatives at Chicago and Los Angeles. These are the most recent additions to a list of centers throughout the country where industry may obtain information and assistance in connection with the production and utilization of nickel alloys. These representatives are qualified by education and experience to offer counsel on problems of materials.

In the Chicago area, the district representative will be H. L. Geiger, Room 1116, 333 North Michigan Avenue Building, Chicago.

On the west coast, inquiries should be directed to A. G. Zima, 705 Petroleum Securities Building, Olympic and Flower Streets, Los Angeles.

If Increasing Your Profits Bores You...so will this page!

15% TO 25% VARIATION IN SPEED

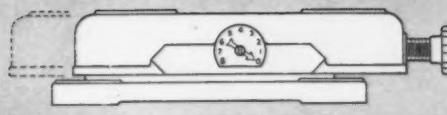


THE new Vari-Pitch Sheave, for Texrope V-Belt Drives, gets the highest efficiency out of your machines and in so doing puts every possible penny of profit into your pocket.

Here is how it is done: by a simple adjustment, which takes but a few moments, the diameter of the Vari-Pitch Sheave can be altered to an extent which will give you a variation in speed of from 15 to 25% per sheave; if both sheaves are of this type the range of variation will be from 30 to 50%.

This permits you to experiment with the minutest fractional increases or decreases of diameter, through the entire range of possible speed variation, to ascertain at just what speed your machinery shows the highest possible efficiency; also you can use the same machines for making different products, some of which may require higher, some lower speed—and do all this without the cost and delay of dismantling the old and buying and installing the new, but merely by a simple adjustment.

Vari-Pitch Texrope Sheaves are made for stationary and motion control.

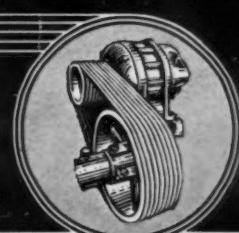


Straitline Automatic Ball Bearing Motor Base developed for the motion control Vari-Pitch Sheave. You simply turn the hand wheel to alter the diameter of the sheave and simultaneously the base moves forward or backward to maintain proper belt tension.

Write for Vari-Pitch Bulletin No. 1261

Belts by Goodrich

A T E X R O P E D I V I S I O N
ALLIS·CHALMERS



M I L W A U K E E W I S C O N S I N

The Metallization of Machine Elements

(CONCLUDED FROM PAGE 51)

face. Therefore, it is best to prepare the surface in some manner which minimizes this possibility. For preparing surfaces of this kind, the nose of the tool should be rounded and the piece rough-turned and then thoroughly sandblasted. The rough turning will create small ridges which will prevent any lateral movement of the coating, and the sandblasting will insure good bonding.

Also, in undercutting a surface to be metallized, care should be taken to insure that the area of the base metal is above the scrap limit. In other words, do not undercut to such a depth that the base metal will not carry the load imposed upon it. As a rule, there is sufficient difference between the design stress and the working stress in machine parts so that they may be undercut sufficiently without danger of overloading.

Application of Coating

It is essential that the coating be applied as soon as possible after the surface is prepared. If the work to be coated is exposed to the atmosphere, water vapor and dust particles will collect on it and lessen the effectiveness of the bond.

The metallic coating may be applied in either of two methods. The operator may hold the gun in his hand and pass it slowly back and forth over the work, or, if the piece being sprayed is cylindrical, the piece can be held in the lathe between centers and the gun can be mounted on the tool post. The latter method is to be preferred in coating all cylindrical surfaces as it will insure a coating of even depth, and the coating will be more nearly homogeneous.

The "gun" should be so mounted that the spray is directed slightly above or below the axis of the work, depending on the direction of rotation. The angle should be such that the spray is directed under the bars on the side of the

threads. This enables the minute metal particles to lodge in the crevices and increase the bond.

The metallizer, as a rule, is mounted on the tool post and fed slowly back and forth across the rotating surface to be sprayed, by means of the screw feed. The speed of rotation of the work should be regulated to suit the diameter of the piece being sprayed, and the traverse speed of the spraying tool will depend on the surface speed of the work. The relation of the two should be such that a good overlap is assured as the coating is applied.

Sprayed metal coatings are quite unlike the solid metal, and a grinding wheel that is satisfactory for solid material is not always suited to sprayed coatings. The following wheel size and speeds are recommended by the Norton Co., Worcester, Mass.: wheel size, 18 in. by 2 in. by 5 in.; traverse speed, 100 in. per min.; wheel speed, 6000 surface ft. per min.; work speed, 160 r.p.m. for a 2-in. dia. shaft; and all grinding to be done wet. The same company has issued the following wheel recommendations: for stainless steel coatings use 3846-KSB Alundum or 3746-M Crystolon; for high-carbon steel use 46-JSB Alundum, and for low-carbon steel use 46-JSB Alundum. The concentration of coolant should be one part soluble oil to 40 parts of water.

All grinding should be done wet, and heavy cuts should be avoided in order that the coating will not be burned or the bond loosened.

Grinding is to be preferred for finishing machine element work. But, with the exception of high-carbon coatings, practically any sprayed coating can be satisfactorily machined. If it is desired to machine a high-carbon coating, the coating must first be annealed before it can be cut. Also, the cutting tool must be kept sharp and pointed. In addition, the cuts

should be light. In machining metallized surfaces, whether it be turning, drilling, milling, or reaming, the cutting edge must be kept sharp.

A layer of sprayed copper about 0.002 in. thick offers ample resistance to the penetration of carburing gases at 1830 deg. F. and can be used for coating those portions of steel articles which are to remain soft after the case is applied.

A test has been made to determine the bonding strength of sprayed metal. In this test a splined section of an axle shaft was drilled out and the hole ground to 1.500 in. One end of another shaft was threaded, built up with the metallizer and ground down to a 0.0015-in. press fit in the above piece. A spline was cut on the other end to fit the torsion machine.

The splined section was pressed onto the shaft and a force of 8000 in.-lb. was required to press it on. The assembly was then placed in a torsion machine. The splined section was held stationary and the load was applied to the shaft. It required a load of 12,000 lb. to move the shaft in the bearing. When the shaft was pressed out and the metallized portion examined, no sign of failure was evident.

It is not recommended that shafts containing keyways or sharp corners be metallized, as the sprayed metal, due to its brittle nature, has a tendency to chip off.

If a certain hardness is required of a sprayed surface, it must be kept in mind that the hardness of the metal in the sprayed form is considerably more than the hardness of the metal in the wire form. In the wire form, high-carbon steel has a hardness of about 255 Brinell, and when sprayed the hardness increases to 370 Brinell.

It is important that the spray gun be properly operated and adjusted as the fineness of the grain affects the bonding characteristics of the sprayed metal. Small particles can more easily get into the minute fissures of the prepared surface, thereby insuring a better bond.

Next week the author will discuss experiments determining tensile and shear strengths of metallized coatings, corrosion data for various sprayed metals, etc.—Ed.